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METHODS IN EDUCATION

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METHODS IN EDUCATION

BY

THOMAS J. McEVOY

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PREFACE

THIS book is a working guide for students and teachers who are striving for unity in education. Content, arrangement, and style are determined by existing needs, and the treatment as a whole conforms to modern educational thought.

The first edition was announced as the cumulative product of contributions from pupils, students, and teachers. It embodied the results of experience in normal schools, summer schools, teachers' institutes, and the elementary schools of New York City. Immediate public acceptance was a gratifying indication of the demand for terse, practical, and specific presentation. This second edition has the same characteristics, but the revision of subject-matter carries the benefit of three years more of experience in working with hundreds of graduates from the leading pedagogical schools of America.

Personal gratitude is expressed for all sources of help in making this book a true exposition of what has been done and should be done in systematic education.

NEW YORK CITY, May, 1911.

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METHODS IN EDUCATION

METHODS IN EDUCATION

CHAPTER I

INTRODUCTION: THE SCOPE OF THIS BOOK

1. The purpose of education.— It is not necessary to try to construct a new definition of education. By examining a few of the definitions we find that the best modern thinkers consider that education should give to each individual a full development of all his powers. This means physical power, intellectual power, and moral power. It is a threefold harmonious development that enables each individual to know, feel, and do his duty to himself and to the civilized community in which he lives. This meaning of education implies culture, efficiency, discipline, knowledge, development, character, and citizenship, — the seven ideals found in the history of education in western civilization.

2. Our general view or plan. — The purpose of education expresses an aim or ideal. It gives us a criterion for educative effort. The second desirable consideration is the subject-matter suitable in attaining the ideal, a consideration relating to the curriculum or course of study. The use of the course of study brings up the consideration of procedure or methods. As we take these considerations one by one or together, we must think of the child or the one to be educated. This fourth topic necessitates the application of psychological principles of education in justifying methods of teaching.

Thus a serviceable comprehension of methods in education implies a blending of these five considerations:

1. Ideals, aims or purpose in education.
2. Subject-matter in education: the curriculum.
3. The mind to be educated: psychology.
4. Method in education: the processes.
5. General organization: school management and discipline.

3. Meaning of pedagogics. — As an illustration of the tendency toward comprehensive treatment of topics in education, many schools are classifying their educational courses under the term pedagogics. The word pedagogics is derived from two Greek words meaning the training or guiding of boys. Its larger signification at present covers the theory and the practice of teaching as a profession, embracing the application of history and principles of education, methods of teaching, school management, psychology, and ethics.

4. Scope of methods in education. — The treatment of methods of teaching is usually restricted to particular ways of presenting arithmetic, geography, grammar, and other subjects in the curriculum. But the larger conception in modern educational thought requires the teacher to see and feel that the presentation of daily lessons is only one methodical act in habit-formation; all the other educative acts in and out of school are subject to the laws governing methods of teaching. This book aims, therefore, as outlined in section 2, to treat under methods in education many aspects of school work not usually discussed under methods of teaching. This view is defended on the ground that education is a unified or blended result rather than an aggregate of a series of independent acts.

CHAPTER II

THE CURRICULUM

5. Curriculum and course of study distinguished. — By many writers these terms are considered interchangeable, but the following quotation gives a good distinction: "By the curriculum is meant the logical, complete, and unified conception of the studies and exercises of the schools regardless of their administration, while by the course of study is meant the arrangement and grouping of these studies and exercises for the purpose of bringing them effectively to the learners." For an elaboration of this conception, see Ruediger's *The Principles of Education*, page 225.

6. The teacher and the course of study. — The average teacher has little to do in making a course of study, but every teacher has much to do in carrying out the requirements of prescribed courses. It is necessary, therefore, to know the underlying principles so that the mutual rights of the child and the curriculum may be wisely adjusted.

7. The pupils and the course of study. — In the first place, a course of study is not a rigid standard of work, irrespective of pupils, teacher, and methods; it is, on the other hand, conditioned by those three factors, and all four must yield to satisfy the needs of each. When Rousseau insisted upon a curriculum of natural material, adapted to the nature of the child, he directed attention

to what has recently been recognized, namely, that the needs of the child must determine the course of study, and not vice versa.

8. Principles determining course of study. — Our conception of education embodies the reciprocal relations of the individual and society. It is not enough to know our civic duties; right thinking must pass into right action. So the first principle is a sociological one; the second, psychological. The former shows what subject-matter will tend to develop broad, useful, efficient knowledge; the latter indicates the manner of adapting the chosen subjects to the capacities of individual minds.

9. Butler on the course of study. — An application of the principles mentioned in section 8 is found in the course of study outlined by President Butler of Columbia University. In defining education he says: "What does the term mean? I answer, it must mean a gradual adjustment to the spiritual possessions of the race. Those possessions are at least five-fold. The child is entitled to his scientific inheritance, to his literary inheritance, to his aesthetic inheritance, to his institutional inheritance and to his religious inheritance."

The scientific inheritance is found in geography, nature study, mathematics, and physics; the literary inheritance includes all forms of literary composition and interpretation; the aesthetic inheritance includes drawing, music, and all other kinds of art that may aid in forming a higher conception of life; the institutional inheritance is found in all kinds of civic training, including political geography, history, civics, and all the subordinate forms of government represented in state and municipal organizations; and the religious inheritance

includes all forms of training that are conducive to spiritual perfection.

The course of study in New York City is in agreement with the requirements mentioned by Butler.

10. An eclectic course of study. — Modern courses of study are said to be eclectic because they embody the chosen culture products of civilization. To complete the five inheritances mentioned in the last section, it is suggested that a sixth, industrial inheritance, be added to satisfy the recognition of industrial training as a part of systematic education. As an interesting study in development, recall what was taught in the oriental nations and then trace the history of courses of study. The following courses are suggested, with references to McEvoy's *Epitome of History and Principles of Education:*

1. Greece — Music and Gymnastics, pages 38 and 58.
2. Rome — Utilitarian Tendencies, pages 60 and 70.
3. Monasticism — Seven Liberal Arts, page 86.
4. Early Christian Universities — Law, Medicine, Philosophy, Theology, page 102.
5. Sturm — Classical High School Course, page 128.
6. Jesuits — Ratio Studiorum, page 130.
7. Comenius — Nature, page 154.
8. Spencer — Science, page 216.
9. Modern — Eclectic. See opinions of Harris, Dewey, DeGarmo, Butler, and others.

11. Contrast of courses of study. — Twenty-five years ago the elementary school taught reading, writing, spelling, grammar, geography, United States history, and what was called civics. In order to fill in the time arithmetical rules of no possible use in life were taught

and the children's wits were exercised or blunted by outlandish mathematical puzzles; a manual of United States history and the constitution of the United States were learned by heart; long lists of meaningless names were memorized in geography; parsing, with the utmost detail, was continuous; drawing, where drawing was taught, was exclusively from flat copies, and the crowning glory of the school was held to be the ability to spell sesquipedalian words whose signification had never dawned upon the childish intellect.

The additions are nature study, intended to train what President Eliot calls the "capacities for productiveness and enjoyment" through the progressive acquisition of an elementary knowledge of the outside world; algebra, chiefly as an aid, through the equation, to the solution of arithmetical problems; inventional geometry; literature, studied as such, distinct from the ordinary reading lesson; language and composition, as the act of expression; drawing from objects; and manual training and other physical exercises. This seems a long list, and yet every subject is justified and required by the fundamental assumption that the school exists for the progressive adaptation of the child's mind to its spiritual environment. In other words, each child has a right to the acquisition not only of the tools of knowledge, but at least to the beginnings of a knowledge of literature, of science, of art, of institutions, and of ethics, so that when he leaves school he may be able to continue along the road on which he has started. — W. H. Maxwell, *N. E. A. Address, St. Louis*, 1904.

12. Enriching the course of study. — This expression is an indication of an effort to frame a curriculum that will satisfy the majority of pupils. The first para-

graph in section 11 mentions a rigid course formerly used; but as a large number of pupils must leave school before completing the elementary course, it is desirable to give them some knowledge of the advanced subjects which bear directly upon the affairs of life. It has been found, too, that for all pupils the elements of advanced subjects may be taught long before technical words are understood. This effort to give breadth, utility, and interest to all elementary work is called enriching the course of study. For illustration see second paragraph in section 11.

13. The culture epoch theory in relation to course of study. — This theory may be expressed in these words: "The individual mind in its development repeats the order of development of the race mind." The history of civilization presents certain stages or epochs as the pastoral epoch, the nomadic epoch, the stone age, the bronze age, the hunting stage, the agricultural epoch, and so on. It is believed that each stage of race development shows certain culture products in religion, history, literature, etc., and that such culture products should be arranged in the course of study for the corresponding epochs or stages in child development.

Opinion by Roark

Any attempt to apply the theory closely must be futile, for only the most general correspondence can be found between the periods of the child's development and the epochs of race growth. Even if it were possible to establish exact correspondence, it would be unwise to plan a course of study and methods of teaching in strict conformity therewith, for the sufficient reason that, in

his recapitulation, the average child exhibits some characteristics it is highly desirable to eliminate. The child, as the heir of the race, should be put in possession of only the best which the race has gained for him. And he should be trained to adapt himself to the actual conditions of modern life, not to those of bygone eras. — *Economy in Education*, page 211.

The American View

In America this theory has not been generally accepted. The experiments that have been made here are based upon the manumental arts in recognition of the efforts of the race to adjust itself to its material environments. We do, however, admit that there should be an adaptation of subject-matter in a course of study, and the culture epoch theory has given some aid in making this adaptation. We may broadly classify the elementary period of school life under the imaginative stage, the memory stage, and the reasoning stage. The general divisions of subject-matter are in harmony with these phases of mental activity. The following quotation aptly expresses the thought: "Fairy-tales for the child, history for the youth, philosophy for the man."

14. Correlation of studies. — Correlation is putting such subjects side by side at a given time in the course as will help to bring to view the universal relations involved in the study of any one of them. — Tompkins, *Philosophy of Teaching*, page 263.

Correlation Illustrated

"In treating the Hudson river as a type we come upon the mountains, forests, water power, and manufactur-

ing of its upper course; the navigation, cities, railroads, and scenery of its lower course; its commercial connections by canal with the coal fields of Pennsylvania, with the forests of the north by canal to Lake Champlain, with the Great Lakes by the Erie canal along the Mohawk to Buffalo. The harbor and city of New York and their easy connections with the Great Lakes and the upper Mississippi Valley, are on one side, with the Atlantic coast and the marts of Europe on the other. Historically, the Hudson is very attractive; Hudson and his contact with the Indians, Washington and his campaigns, the old forts and the battle scenes, Arnold and André, Burgoyne's invasion. In literature Irving has made certain spots on its banks as famous as the old battle grounds. From a purely scientific standpoint, the great drowned valley, its palisades, mountains, and incoming ocean tides are at once suggested. Thus we have the relations of geography to history, literature, and natural science."

15. Report of the Committee of Fifteen on correlation of studies. — Your Committee understands by correlation of studies:

I. *Logical order of topics and branches*

First, the arrangement of topics in proper sequence in the course of study, in such a manner that each branch develops in an order suited to the natural and easy progress of the child, and so that each step is taken at the proper time to help his advance to the next step in the same branch, or to the next steps in other related branches of the course of study.

II. *Symmetrical whole of studies in the world of human learning*

Second, the adjustment of the branches of study in such a manner that the whole course at any given time represents all the great divisions of human learning, as far as is possible at the stage of maturity at which the pupil has arrived, and that each allied group of studies is represented by some one of its branches best adapted for the epoch in question; it being implied that there is an equivalence of studies to a greater or less degree within each group, and that each branch of human learning should be represented by some equivalent study; so that, while no great division is left unrepresented, no group shall have superfluous representatives and thereby debar other groups from a proper representation.

III. *Psychological symmetry — the whole mind*

Third, the selection and arrangement of the branches and topics within each branch considered psychologically with a view to afford the best exercises of the faculties of the mind, and to secure the unfolding of those faculties in their natural order, so that no one faculty is so overcultivated or so neglected as to produce abnormal or one-sided mental development.

IV. *Correlation of pupil's course of study with the world in which he lives — his spiritual and natural environment*

Fourth and chiefly, your Committee understands by correlation of studies the selection and arrangement in orderly sequence of such objects of study as shall give

the child an insight into the world that he lives in, and a command over its resources such as is obtained by a helpful co-operation with one's fellows. In a word, the chief consideration to which all others are to be subordinated, in the opinion of your Committee, is this requirement of the civilization into which the child is born, as determining not only what he shall study in school, but what habits and customs he shall be taught in the family before the school age arrives; as well as that he shall acquire a skilled acquaintance with some one of a definite series of trades, professions, or vocations in the years that follow school; and, furthermore, that this question of the relation of the pupil to his civilization determines what political duties he shall assume and what religious faith or spiritual aspirations shall be adopted for the conduct of his life. — Pages 40, 41.

16. Concentration of studies. — A curriculum based upon concentration of studies has one study as the centre or core, and other related studies are grouped around the core. Ziller, a disciple of Herbart, used literature and history as the core; Colonel Parker used geography; and John Dewey advocates manual training.

Concentration favors a strict interpretation of the culture epoch theory. Germany favors concentration, but America does not. Ziller used Robinson Crusoe as the central study. All language lessons were based upon it; arithmetic measured the voyage, the time on the island, the number of sheep and goats, etc.; geography became vivid by tracing the routes and locating the island; constructive powers were exercised in imitating Robinson in making ladders, fish-hooks, tools, and other equipments; moral lessons were learned from Rob-

inson's patience, kindness, and perseverance. In America, Hiawatha has been used in making similar typical lessons.

17. Co-ordination of studies. — The arrangement of studies in groups of equal rank is co-ordination of studies. See Butler's views in section 9.

18. Correlation, concentration, and co-ordination distinguished. — Observe that concentration makes use of one central study with radiating lines of related knowledge; that co-ordination makes use of more than one study, — five in the scheme of Harris, such groups being of equal value; and that correlation utilizes the general lines of related knowledge running through and unifying all the subjects and all the groups of subjects in the course of study. Correlation is a general term including concentration and co-ordination.

CHAPTER III

MAXWELL ON THE COURSE OF STUDY

19. A modern type. — The New York City Course of Study has been widely discussed as an illustration of recent efforts in the organization of subject-matter. Theoretically, it is ideal for a typical American city like New York; practically, it is requiring modification especially on the quantitative side. Such changes are expected, however good the course of study may be, on account of the varying needs of the community and the changing viewpoints in education.

This chapter deserves consideration by students who desire to have a practical discussion of a course of study as a whole. Principles and methods are clearly exemplified in this address, which was delivered by Dr. William H. Maxwell, City Superintendent of Schools, before the New York City Teachers' Association and the Society for the Study of Practical School Problems. His subject was SOME PHASES OF THE NEW COURSE OF STUDY. The address was reported by E. F. Smith and printed in the *Metropolitan Teacher* in May, 1904. The publishers of that magazine gave us permission to publish the address.

The Address by Dr. Maxwell

20. Principles and methods. — In discussing some phases of the new course of study, I shall deal princi-

pally with the foundation, the principles of education that seem to underlie it, and I shall take occasion incidentally to illustrate some of my points by referring to methods of teaching.

21. Object of education. — The first thing to be considered in making a course of study is that exceedingly difficult and exceedingly complex, but always extremely interesting question, What is the object of educating the child at all? In looking for this object, in trying to determine the aim of elementary school education or of any education, there is nothing better to be found than that very comprehensive statement which appears in the report of the Committee of Fifteen, namely, that the object of education is to bring the child into harmony with his environment. Now what does this expression mean? What is meant by saying that the child is to be brought into harmony with his environment?

22. Harmony with environment: intellectual. — First, it means that in so far as our time, our ability, and his aptitude will permit, the child is to be put into possession of the intellectual inheritance of the race. He belongs to the human race, whose history has been that of many great achievements, and therefore it must be assumed that education involves a knowledge of some of the things by which the race has made progress in the past. Some of the things, because the range of human knowledge is now so enormous that no one human mind can compass it. There are, however, certain of these things that any one of ordinary intelligence can comprehend, can take in, and these the child should comprehend if he is to be in harmony with his environment.

23. Harmony with environment: moral and ethical. — Second, the bringing of a child into harmony

with his environment implies the development of certain moral or ethical qualities; these may be summarized under three great heads: Reverence, Courage, Simple-minded Devotion to Duty.

The development of these virtues is necessary because without them no one will build surely and steadfastly upon the former achievements of the race. In other words, a man may know many things that are very useful, pleasant, and ornamental; he may know them well and thoroughly; but if he has no reverence, if he has no courage, if he has not simple-minded devotion to duty, his knowledge will be of little avail.

24. Harmony with environment: physical. — The third consideration in the adjustment of the child to his environment is the development of his physical powers. He must have health, strength, and agility of body, and skill of hand. A man may have knowledge, he may have these great ethical qualities of reverence and courage and simple-minded devotion to duty, yet if he has not health and bodily strength and some skill of hand, he will accomplish little. What will a man give in exchange for health? No amount of study, no amount of intellectual attainment, no amount of accomplishment in the purely intellectual sphere will ever compensate anybody for the loss of health.

25. Summary. — These three things, then, are necessary to bring a child into harmony with his environment:

1. Putting him into possession of his intellectual inheritance.

2. Developing the three great moral qualities of reverence, courage, and simple-minded devotion to duty.

3. Developing his health, strength, and agility of body, and giving him the use of his hands.

26. Extent of intellectual inheritance. — What things are included under the intellectual achievements of the human race? What is our intellectual inheritance? If this be determined, then the subjects that should be included in the curriculum of a school are known. And here we may follow a great thinker and fellow citizen, President Butler, of Columbia University. You will agree that his classification of the intellectual inheritance of the race is a comprehensive one:

Literary inheritance, aesthetic inheritance, scientific inheritance, institutional inheritance, religious inheritance.

Literature, art, science, institutions, religion, comprehend the intellectual inheritance of the race. In the new course of study, each one of these great departments of our intellectual inheritance is represented. (Butler, *The Meaning of Education*, pages 3–34.)

27. Literary inheritance. — Literature is represented, even in the very lowest grade, by the fables, and the folk stories, and the memory gems; in higher grades by the readers — and in the highest grades by masterpieces of literature.

28. Aesthetic inheritance. — Aesthetics is represented by the study of pictures, by drawing, by water-color sketches, and by music. In all classes, as is the case in a great many classes, photographs of fine pictures should be on the walls. They should, however, be there for some other purpose than simply to hang on the walls. They should not be pictures and nothing more to the pupils, but even so they just make some impression, if, as we fondly believe, the children are trained to some sense of beauty by merely looking on what is beautiful.

Drawing, water-color sketches, and music serve to cultivate the aesthetic sense of the children, and the city itself presents also great opportunities for teaching children something of what is fine in architecture. A great deal can be done for this city by including something of a taste for fine architecture. Examples of what is fine in architecture exist here side by side with examples of what is most atrocious. For instance, the Flatiron Building is one of the most hideous structures in America, while only a few steps away from it may be seen one of the most beautiful buildings in this country, a perfect gem of architecture, the Court House of the Appellate Division, at the corner of Madison Avenue and 25th Street. Many of our schoolhouses are specimens of good architecture, and those who live in other boroughs should take a journey up to the Bronx to see that beautiful building, the new Morris High School, which, situated on a hill, dominates the landscape.

29. Scientific inheritance. — Our scientific inheritance is represented in the course of study by nature study, by mathematics, under which is included arithmetic, algebra, and inventional geometry, by physical geography, and by physics.

30. Institutional inheritance. — Our institutional inheritance is represented by political geography and by history, and it will be still better represented in the near future, when we come to study municipal government with more care than we do now.

31. Religious inheritance. — Lastly, our religious inheritance is represented by ethical training, although the doctrines of any particular sect cannot be taught. This training comes partly from the habits built up through the administration of a well-ordered school,

and partly from the study of all the subjects, particularly literature and history.

32. Assimilation by child. — Now, if these five divisions of our intellectual inheritance should all be represented somewhere in the course of study, the next question that comes up is, should something of each of them be taught from the very start, or should some of them be taken up later in the course? That is a nice question — a question upon which opinion will possibly differ, but for my part I have come to the conclusion, along with my colleagues, that some part of each one of these five great divisions of knowledge should be represented in every grade of the course.

The opinion now held of a child's nature is more rational than that of years ago. In the little child, not more than four or five years of age when he first comes under your guidance, in that little body there is included the promise and potency of everything that afterwards develops into the full grown man or woman, just as a bud contains, in rudimentary form, the fully developed flower. The little child has a right to whatever part of his inheritance he can assimilate; he is entitled to have all of his powers developed from the start. Some of them will develop more rapidly than others, but all will develop more or less, provided they are supplied with the proper nourishment.

33. Variety. — In the second place, the child mind, particularly in the beginning, craves variety. There can be nothing more dull and deadly, nothing more likely to check the development of a child's mind, than to occupy it all the time with one kind of work, or even with two or three kinds of work, particularly upon the formal sides of reading, writing, and arithmetic. If you

would stupefy the child's faculties, if you would prevent his latent powers from developing, occupy him during his first years of school with a dull, monotonous routine. Only when the child has grown into a man does he devote all his time to one or two subjects. In the earlier stages he needs variety and he needs a broad foundation to support the edifice of specialization. Like the pyramids, the educational structure must be broad at the base and gradually taper to the top.

34. Quantity of matter. — Some objection has been made to teaching so many subjects to young children. It has been said that they are given more than they can assimilate.

The person who makes such a statement, either wilfully misleads, or does not understand what is being done in the schools. In the primary schools, science is not taught as science, mathematics is not taught as mathematics, institutions are not taught as institutions. The child does not study these subjects separately. The child does not know the divisions of knowledge; he simply learns facts as facts. To put a flower into a child's hand and direct attention to its colors and parts, is to give him a lesson in botany; and this lesson is just as easily comprehended by the child as is a lesson on reading the word cat. Only very gradually he learns to classify and arrange facts in the separate departments of knowledge.

Principles in Teaching

35. Objectivity. — The next question arises as to the principle upon which the facts to be observed and taught should be selected and arranged. The first of these principles is familiar because it has been expressed in

books upon principles of education and methods of teaching over and over again. Sometimes the expression is "from the known to the unknown, from the simple to the complex;" sometimes "from the concrete to the abstract." The meaning underlying these expressions may be reduced to a form that will be our first principle: Select those parts of a subject that can be presented objectively or that will appeal immediately to the imagination of the child, for perception and imagination are the strongest powers in the young child's mind.

36. Continuity, correlation, variety. — The second principle is the principle of logical unity or continuity in each of the studies; the third is the principle of correlation of studies, and the fourth is that of variety, or substitution.

Application of Principles

37. Objectivity. — The principle of objectivity is illustrated by presenting in the lowest grade arithmetic in the form of counting, objects of nature, birds, home geography, and striking anecdotes of great men with history. Just one word here, incidentally, upon a subject that does not receive sufficient attention, home geography.

While it is in one of the grades, 4A, home geography should not be limited to this grade, but should be used in illustrations wherever possible throughout the whole course. In lessons in geography, often no reference is made to things at the very door, and there are many who come out of our schools knowing very little about their own surroundings. A boy on the roof playground of one of the schools when asked, after the East and North rivers were pointed out to him, what waters he

was looking at, said he saw the Atlantic and Pacific Oceans.

Do not confine this home geography to one grade, but bring it in whenever it will illustrate the matter in hand. For instance the gutter in front of the schoolhouse or the rivers that flow past this island will always illustrate the very interesting subject of river drainage, and the excavations being made in the city will illustrate the strata of the earth's surface. When you speak of forests, Prospect Park, Central Park, and Bronx Park furnish magnificent illustrations. By referring to Union Square, the plain may be illustrated; ask the children to imagine the square stretching out for hundreds of miles. Some of the parks downtown will give a fine opportunity to illustrate a desert. The usual way of illustrating a mountain by making a little sand heap on the sand tables amounts to little, because the proportion is lost; but if some of our Manhattan and Brooklyn friends could take their children down to Staten Island, for instance, and let them take a look at St. George, they would get a far better idea of what a mountain is than by the sand heap. Even by taking them to Morningside Heights or by showing them the Palisades your object will be accomplished. But objectivity is not then to be dropped. While geography lends itself particularly to illustrations, use illustrations in every subject — illustrations that are near and familiar to the child.

38. Logical unity or continuity. — In arranging the various subjects in the course of study, the next thing to be considered after objectivity is the logical unity or continuity of these subjects; that is, the arranging of topics in such a way that one shall spring out of what

goes before. With each advance, if possible, the relation of cause and effect should be brought out, as in the production of wind through the expansion of air by heat, or the relation between the war of the Revolution and the French and Indian war. In this way alone can be established that wonderful connection between facts which make them part of the very texture of the mind. It is only when rational links of associations are established that knowledge stored away in the mind of the child will remain at its service. Teaching without establishing these links of association has resulted in very great harm to many characters. It has resulted in a lack of decision, simply because, when the decision was necessary, the link of association which would have enabled the individual to deal with the situation was not there. There is no more important work to do than to establish these links of association, which will bind together the masses of matter arranged under each topic from the beginning to the end of the course of study, and in so doing the very best possible means of insuring interest in the work has been taken as well.

Compare for a moment two teachers. One of them takes no pains to establish the link of association, either by speaking of cause and effect, which is the best way, or by any other means. She simply says, " I am going to hammer that knowledge into that boy's head if it takes me all summer;" and she hammers and hammers. What is the result? The child is not interested, and while she is doing her hammering he is thinking of his marbles or of his play. His mind is far away; he is paying no attention, is getting into mischief, and perhaps the teacher thinks, in a moment of weakness — and perhaps the principal too — what a fine thing it would be

if the inattentive boy could be sent to the principal for a walloping; and all because the teaching has not been done in the right way, for if the teacher were bringing out the relations between cause and effect, every child would be interested. Why is this true? Because this desire to know the cause of things, the desire to know the answer of the question, "Why?" is one of the primary instincts of the human race. The child's mind cries aloud for the satisfaction of that instinct, and unless that satisfaction be given, the attention of the children will not be gained, and their minds will be with their games and play. Think of such questions as these, and the interest they may awaken:

Why does the water rise in a pump when we lower the handle?

Why does the mercury fall in the thermometer as the weather grows colder?

Why does the dew gather on the grass at night?

Why are railroads and rivers important in military operations?

Why does dividing the denominator of a fraction multiply its value?

By setting such problems and working at their solution, interest is aroused and maintained because of the appeal to one of the most deep-seated instincts of our human nature. Such teaching is interesting and profitable to children. But this is not all. By it is cultivated the habit of seeking for the cause of events throughout life. That is always the supreme test of good teaching. It is not whether the average is highest on the immediate subject of study, but whether the child has acquired a habit which will be of use to him in life. Make him put the question, and make him try to answer the ques-

tion, "Why?" Then a habit is being established that increases enormously not only the efficiency of every kind of labor, but enhances the pleasure of living. Contrast the laborer, for instance, who strings the electric wires, according to a rule, with a trained intelligence like that of Edison, which never rests without ascertaining the cause of every step in that operation. Which of them leads the more profitable and useful life? Contrast the mind of a vender or seller of flowers in the street with that of an Agassiz or an Asa Gray. Which of them gets the most pleasure out of his work? Contrast the mind of the navigator at sea who ascertains his position by rule of thumb with that of the navigator skilled in the art of navigation who, by means of observations made on the heavenly bodies and the aid of trigonometry, can determine the position of the ship at any moment. Contrast the mind of the teacher who simply sets the task and listens, book in hand, to the recitation; contrast the mind of that teacher with that of the teacher who asks herself the reason for every step she takes and who sees in every mood that mirrors itself in her pupils' faces the manifestations of some all-pervading physiological or psychological law. By keeping the links of the chain tightly bound together, by asking and inciting the pupils to answer the question, "Why?" the links of association are being forged that enable the child to call up and use knowledge when it is needed; a perennial source of interest is being drawn upon that will enliven all school work, and a habit of mind is being cultivated that enhances the pleasure of life and increases its efficiency.

39. Correlation. — The next principle is that of correlation of studies. We in America have not resorted

to that form of correlation which is known as concentration, in whose name so many educational sins have been committed. By concentration is meant the selection of some one subject, usually history, as the core of the course of study, every other study being arranged with reference to this core.

While that principle has not been adopted anywhere in America, correlation is a very important and very useful principle. Correlation is not the teaching of two things at the same time — that is not the meaning at all, but it is using a fact or principle learned in one study, to illuminate or demonstrate something difficult of apprehension in another. Thus, grammar may be made to elucidate obscure or involved sentences in the reading lesson; stories from history brighten the details of geography, and the facts of geography explain, as nothing else can, the movements of history; while the knowledge acquired in arithmetic may be and should be used for quantitative work in every other subject, but particularly in science, civics, and geography.

The difference between lessons based on correlation and those wherein no account is taken of this principle may, perhaps, be made clearer by the following illustrations.

The Rose

The teacher takes a rose from the hand of some little child who brings it into the classroom. She talks to the children about roses; they begin to get interested, when suddenly the lesson stops short, and from talking about roses they come to the reading lesson. How interesting it must be for that little child-mind in love with nature to be called upon to read "See the dog has the rat! I

see the rat. Does the cat see the rat? Can the rat see the cat?" There is not even a little variation in the way of an answer, such as, "No, he can't unless he turns round." After a little while this is stopped, and the drawing lesson begins. No reference is made to what was done in the reading lesson. One child is drawing a square plinth, another is cutting out a dog, and so on. Such lessons as these are offences against correlation.

How differently this work would go on with the help of a little correlation. The nature study begins as before with the rose. Can any more beautiful object be used? Is there anything better to do than to place the rose in the hand of the child, and talk to him about its leaves and petals? He will learn to love it and learn to observe it. He will want to know something about it and find out what its various parts are.

At all events, the teacher has interested the children in the rose. When the reading lesson begins, she does not begin to talk of the dog or the rat, but gets the children talking about the beautiful rose. And as the children talk she has taken some sentences that seem appropriate and pretty and has written them on the blackboard, and by the time they are through with their nature study lessons she has her blackboard covered with things they have said. What better reading lesson can there be than that? What could there be more interesting to the children? But the teacher notices that the things the children have said are not in very good order. There is no beginning or end. She says: "Why, here is something about the color of the rose, and here is something about the perfume of the rose. Now, suppose we write these over." The children dictate, and the teacher puts the sentences together in order on the

blackboard. She is letting the children talk instead of talking herself. They are simply dictating to her and she is writing. She makes no paragraphs. Something new comes up again about the shape of the rose, the number of petals, two or three statements about them, perhaps. She gathers these two or three statements together. They read the description again, and that is the end of the reading lesson.

Observe what has been done. The teacher has given the children the very best possible lesson. They have composed and she has written down. She has simply been their amanuensis, and without giving them any formal instruction she has got them to do the work. Then comes the drawing lesson, and the little boxes of water colors are passed around with paper. What shall they draw? After this combined reading and nature lesson, would not the children like to make a picture of that rose, and would they not like to get one or two sentences from the board and write them under their picture? That is correlation. Is it not possible?

In the higher grade the teacher was giving a reading lesson describing a place in England. Then she passed to the geography lesson; this was about Russia. Then she had the children reproduce something about Africa. The history lesson was about the French and Indian war, and the drawing was something that was not in the likeness of anything in the heavens above or the earth beneath. That is an example of lack of correlation in a higher grade. Here are a few examples of what seems to be legitimate, wise, and proper correlation:

History and Geography

In the first place, correlate history and geography, and don't do it by trying to teach two things in one lesson; but when giving the history lesson, use the knowledge of geography that the children have already acquired to fix every prominent place in the history. Correlate your geography lesson with the history lesson, for unless the child's historical knowledge is rooted to his geographical knowledge he will not retain it. Teachers make children memorize long lists of names over and over again. Of what use is it? The teacher should, however, be able to tell the story of any name associated with any great historical event. Tell some historical stories about Rome, Boston, Salem, New York, Concord, Vicksburg, Philadelphia, instead of trying to make the children memorize the names. Then again arithmetic should be taught with other subjects. Do not try to teach arithmetic when teaching nature subjects, but, whenever possible, correlate the work. It is a good thing to count the petals of the flower in nature study.

Arithmetic

There used to be an examination for graduation from grammar school. The children in most of the schools were splendidly drilled in arithmetic, but they had no idea of applying it outside of the arithmetic hour.

This question was once given to a class: Supposing a piece of property — a house and lot — had an assessed valuation of $6000, and a tax of $26 per $1000, what should the annual tax be upon that house? All they had to do was to multiply the tax by six. Yet these children

thought there was something wonderful about it, and covered pages in trying to get a wrong answer; and what was the reason? The teacher had not done quantitative work, had not applied their arithmetic and made them work out practical problems.

Drawing

Another proper method of correlation is to use drawing whenever possible. Use it whenever the child can better express his meaning in that way. Let him make a sketch right in the middle of his composition. I saw very recently a letter from a little girl who was taught in a school where this custom had been followed. This little girl — she is ten years of age — was describing to a little girl friend — she never knew I would see the letter — how another friend fixed her hair, and she found it hard to get the right words to express her ideas, so she drew a little pen and ink sketch. The little sketch was very good, and showed just how the hair was arranged. Use drawing whenever possible, and particularly in nature study, for there can be no proper study of nature without the objects, and no proper study of these objects unless they are drawn. This is absolutely essential.

Language Work

Another place where correlation may be applied is in language work. To illustrate this, take the type sentences in one of the primary grades. It is an important thing for the teacher to know that all sentences can be reduced to five primary types, and it is important to the child — not to be told that there are five types — that information is not of any use to him; but

it is important for him to know how to make sentences according to those five types. The first type of sentence is simplified by the expression, what things do, as, The dog barks, Birds fly; the second, what things are, as, Men and dogs are animals. The third indicates what quality things are; the fourth, what things do to things; and the fifth, what is done to things. All the material used in other studies can be introduced in the making of sentences after these models. All thought must be expressed by one or the other of these five forms, and in thus correlating the study of the sentence the work done in the other subjects is being reviewed, while at the same time the foundation for future grammar studies is being laid.

Memory Gems

There is another form of correlation by means of the memory gem — the thing the child memorizes. Correlate this with the spelling lessons. Instead of dictating to the children every day, once in a while ask them to write from memory a few lines that they have learned. The selection of gems of poetry and prose laid down in the course of study was very wisely made by the committee of principals. The children should learn these, and then write them from memory once in a while instead of taking dictation.

Formal and Content Studies

But here a very important question arises, one about which there is a great deal of discussion. Shall the formal studies, such as penmanship and the beginnings of arithmetic, be correlated with the content studies? Certainly, for it is the only way to make the child begin

to recognize the symbols used for expressing the words in written form. Yet there can be no doubt that the best results cannot be obtained by teaching the formal studies only as incidental to the content studies. A lady who had quite a reputation as a teacher, and who loves her work, once said that when a child was learning to read she paid no attention to the formal side, but fixed all her attention on the content side, and that when the child did not know a new word she told him the meaning. The objection to that is that it does not develop power in the child. The child must be given some means by which he can determine the meaning of a new word when the teacher is not present to tell it. Literature cannot be enjoyed if the words are not understood, and no student enjoys the reading of a great work if he has to look up every word in the dictionary; no one can apply grammar to the correction of his own composition unless he has learned the classifications, the rules, and the definitions. In the first stage, there must be some reading, and the child will enjoy the study if it is well taught, if you will give him a reason for enjoying it. He enjoys a story, and if the story is read to him, he will show that he appreciates and enjoys it. He will want the book to get that beautiful story. By reading to him he gets the motive to read for himself.

40. Substitution or variety. — The reason the principle of variety has been introduced is, first, that the children get tired of one subject when they are kept at it too long, grade after grade. The new course prevents monotony. In the second place, the new matter is really easier for the child than the more difficult parts of an older subject. The beginnings of more than one part of the main divisions of study may be necessary

in order to enable the child who no longer goes to school to adapt himself to his environment and to enable him to pursue his studies by himself. English history has been introduced in the seventh year, in the first place because the children get very tired of American history; and in the second place, because they understand and appreciate American history much better after studying English history for a year. Algebra and geometry have been put in the seventh year, so that the children may not get utterly tired of arithmetic, and may be able to use equations in solving the more difficult problems of arithmetic. These, very briefly, are the reasons for these substitutions.

CHAPTER IV

PRINCIPLES OF EDUCATION

41. Justification of this chapter. — If any educator is inclined to question the appropriateness of a chapter on psychology in a text-book on methods in education, let him consider the necessity of giving a reason for every process in teaching. Reasons based on personal opinion or local success may be good, but the only reasons strong enough to command general acceptance are those supported by psychological principles of education. A knowledge of approved methods does presuppose familiarity with elementary text-books on psychology and principles of education, but surely there is no valid objection to an attempt to unify the essentials of acquired knowledge in a book of this kind. The argument for convenience alone might be made a justification, but a better reason is the purpose of helping students who are trying to harmonize definitions of education, courses of study, psychology, and methods under a modern conception of effectual education.

42. Limitations and options. — The terse presentation of essentials in this chapter is intended as a guide to the interpretation of subsequent chapters, but no student is expected to consider these few pages a substitute for an approved text-book on psychology. In this matter, as in all other decisions on collateral study, the judgment of an earnest student is a safe criterion.

Other definitions may be preferred, too, but these are chosen on account of simplicity, directness, and brevity.

Definitions

43. Consciousness. — Consciousness is the name given to all possible mental operations. — *Dexter and Garlick's Psychology*, page 2.

Consciousness is that indefinable characteristic of mental states which causes us to be aware of them. — *Halleck, Psychology and Psychic Culture*, page 44.

44. Mind. — Mind is a spiritual force that manifests itself in knowing, feeling, and willing.

45. Knowing. — Knowing is the act of affirming the certainty of states of consciousness.

46. Feeling. — Feeling is a term that indicates pleasant or painful states of consciousness.

47. Willing. — Willing is the act of the mind in making a choice of desires.

48. Will. — The will is the power which operates in the mind in willing.

49. Faculties. — A faculty is a mental power which acts upon objects, external or internal, and discriminates them from one another. We must not, however, think of the mind as composed of separate faculties. The mind is a unit, but it can manifest itself in different ways; and for convenience we shall use the word faculties to indicate the different manifestations of power.

50. Object, action, product of a faculty. — That on which the mind acts in the exercise of any faculty is termed the object of that faculty. I hear a peal of thunder; the sound so heard is the object of the faculty of hearing. The action of this faculty is called listen-

ing; the product of such action on the object referred to is a notion or idea of the sound of thunder. — *Welch, Teachers' Psychology*, page 4.

In teaching, the subject-matter of instruction is the object; the principles of education are applied in the action; and the product is the ultimate purpose of all education.

51. Attention. — Attention is the centering of the act of any faculty upon its object, by an impulse of the will. — *Welch*, page 5.

Consciousness occupying itself with an object is attention. — *Horne, Psychological Principles of Education*, page 314.

Attention is that act of the mind by which we bring into clear consciousness any subject or object before the mind. — *Gordy, New Psychology*, page 111.

Attention is concentrated consciousness. Attention is not a faculty of the mind; it is simply a concentration of consciousness upon some particular object, external or internal.

52. Interest. — Interest is the name given to the pleasurable or painful feelings which are evoked by an object or an idea, and which give that object the power of arousing and holding the attention. — *Dexter and Garlick*, page 31.

53. Apperception. — Apperception is the process by which a mass of presentations assimilate relatively new elements, the whole forming a system. The new material assimilated may be either given in sensation or reproduced by the internal working of the psychological mechanism; and attention, in the broad sense of noticing an object, coincides in the main, but not altogether, with the apperceptive process.

Apperception is the interpretation of new knowledge in the light of that previously obtained: mental assimilation.

54. Sensation. — A sensation is a state of consciousness resulting from nerve action. — *Halleck*, page 59.

A sensation is a simple mental state resulting from the stimulation or excitation of the outer or peripheral extremity of an incarrying or sensitive nerve. — *Sully.*

55. Sense-perception: the gathering of percepts. — Perception is the general name of a faculty through whose action the mind gains knowledge, whether of things without or within ourselves. Sense-perception is the faculty which supplies the mind with knowledge of external objects through the action of the senses of touch, sight, and hearing. In exposure to a storm I see, hear, and feel the driving rain. In this act of sense-perception the senses employed are those of touch, sight, and hearing. The object is the driving rain; the acts put forth are feeling, seeing, and hearing; and the product of these acts, while in progress, is a notion or *percept* of the rain. The percept in this case unites in itself the elements gained from feeling, seeing, and hearing. If the object of my sense-perception had been a thing which was visible but not tangible, or audible, as a picture, a cloud, or a rainbow, the percept would have contained only the elements gained from the act of a sight. — *Welch*, page 5.

56. Observation. — The special function of the senses is sensation, a responding to any external stimulus that affects nerve tissue. The corresponding function of the mind in referring these sensations to their external causes is perception. Sensation and perception taken together may be called observation. — *Roark, Psychology in Education*, page 68.

Observation is the acquisition of knowledge by direct sense-perception.

Observation is the act of looking at a thing closely so as to take note of its several details and parts.

57. Memory: storing percepts. — Memory is the faculty which unconsciously receives, retains, and restores the products or ideas gained through the action of the other faculties. — *Welch*, page 6.

58. Imagination: building concepts. — The process of making images is imagination. An image is a revived percept.

59. Conception: holding concepts. — Conception is a mental process which results in a concept. — *Dexter and Garlick*, page 150.

60. Concept. — A concept is a re-presentation in our minds answering to a general name. — *Sully.*

61. Judgment: connecting concepts. — A judgment is an assertion of agreement or disagreement between two ideas. — *Dexter and Garlick*, page 163.

62. Reasoning: deriving concepts. — Reasoning is the faculty that derives new truths or concepts from class concepts already known. — *Welch*, page 11.

63. Self-activity. — Self-activity, as a principle in consciousness, means self-direction. — *Horne, Philosophy of Education*, page 171.

Conscious effort in the evolution of possibilities is termed self-activity. — *Boyer, Principles and Practice of Teaching*, page 35.

64. Habit. — A fixed tendency to think, feel, or act in a particular way is a habit.

Training the Mind

65. The plan simplified. — This topic is comprehensive enough to include the whole field of education. Students are confronted with conflicting theories about the possibility or impossibility of training the faculties, and then further conflict is found regarding effectual methods. Let us take it for granted that the term faculty, as defined in section 49, is used to indicate a kind of work done by the mind, without implying a division of mind itself; that each faculty can be trained, and that the general result is mental training. This mental training implies accompanying moral and physical habits. All these habits constitute education. Let us see, then, how the plan can be outlined as a simple guide for our methods of training the mind.

66. The plan outlined. — This working plan shows the faculties of the mind, or the manifestations of mind, which we have to deal with in educating the child; the laws or principles which guide the effort to bring the mind of the child into the desired relation with the mind of the teacher; and the object, aim, or result of all our efforts in education.

Working Plan for Training the Mind

FACULTIES	PRINCIPLES OR LAWS OF EDUCATION	RESULTS
Sensation.	Law of attention.	Habit.
Perception (Observation).	Law of interest.	Habituation to
Memory.	Law of apperception.	right thinking,
Imagination.	Law of self-activity.	right feeling,
Conception.		right willing.
Judgment.		
Reasoning.		

67. Explanation of the plan. — Much attention used to be given to the natural order of development of the

faculties. That order is indicated in the first column. In each faculty there are physical factors and psychical factors to be considered. The physical factors are the nerves and other material parts of the body; the psychical factors are the mental or spiritual results of the respective processes. These matters are discussed under reaction.

In every educational process there are certain principles of education to be observed. They are given in the second column. Thus in training any one of the seven faculties, all four of those principles should be used; and the order in which they are used is the order given in the second column.

There are many aims in education, but it is possible to summarize all of them in habit. The process of forming habits is habituation. School life may only begin the process, but school life should direct the habituation toward the right end. Think of all the purposes of education as you view them, and see if they are not all included under habituation to right thinking, right feeling, and right willing.

Classification of Principles or Laws

68. Lack of agreement. — The four laws mentioned in section 66 are not the only ones mentioned by those who have written on the principles of education. Herbart could make apperception alone include all processes in education; apperception and self-activity can be considered adequate, since both attention and interest are contributing factors in both; others enumerate forty or more as essential laws. The classifications depend somewhat upon the purpose of the respective writers. One classification may be required in a comprehensive

treatment of the science of education, while another may be suited to psychology. The classification in this chapter is made to help students who need a simple but adequate guide for classroom work. While we favor the four given in section 66, others are given to satisfy educators who demand a wider classification.

69. The principle of sense-perception. — This has been expressed by saying that the mind must gain through the senses everything external to itself; or, as Comenius said, "There is nothing in the mind that has not first been in the senses." As a principle in elementary teaching, it is axiomatic. Out of this principle have grown the maxims, observation before reasoning concrete to abstract, it is better for a child to discover than to be told, empirical to rational, and others. The one large application is multiple sense instruction, or the necessity of appealing to as many of the senses as possible. Thus in a lesson the orange, the five senses are used as sources of sensuous impression.

70. The principle of motor reaction. — The meaning of reaction is expressed in the maxims "no impression without expression" and "every idea tends to realize itself in action." Happiness is expressed by laughing; grief, by weeping; and the rhythmic sensation of music, by dancing. So, too, every impression in teaching must have its complementary expression through verbal reproduction, written reproduction or material reproduction as exemplified in the various forms of manual training.

A brief explanation of the process is necessary. An external stimulus of any one of the senses is transmitted by the afferent nerve to the brain; if agreeable, the brain will receive the message and then transfer the message

by an efferent nerve to the motor organs. Thus the brain is said to react upon sensations. It is the teacher's duty to present all subject-matter in such a way that each mind can receive favorable impressions. Then the mind will react, *i.e.*, convert the impressions into action and thereby complete the process of getting ideas.

James expresses himself thus: Regular response to stimulation is reaction. Education as a process consists in furnishing proper stimulation and in directing the responses. Sensuous impressions are not properly educative if they fail to beget a correlative motor activity. The physiological process is this: (1) impulse from external centre; (2) the translation in the central process; (3) the changed impulse is transmitted to the motor organ. — *Talks to Teachers*, Chapter V.

Reaction implies a close relation between the physical and the psychical. This relation shows the necessity of observing the physical conditions of the child himself, of the school and of the home. Little progress can be made in mental training if the child is hungry, fatigued, ill, or uncomfortable on account of light, heat, ventilation, or seating.

71. The principles of attention and interest. — Attention and interest are so closely related that one cannot persist without the other. Which comes first? Put your thought into practical ways of securing and retaining both and then answer the question by interpreting results. Attention is an attitude of mind and body growing out of and enforcing a feeling called interest. Both attention and interest are habits.

72. The principle of apperception. — See definition in section 53. The educative value of a method is tested by the requirements of apperception.

73. The principle of self-activity. — This principle exacts a distinction between teaching and telling. As the strongest impulse or instinct, it offers the largest field for reactions and stands as a law for both pupil and teacher. It is always a varying but true test of the validity of methods.

74. Other principles. — The principles or laws of aim, induction, and deduction, analysis and synthesis, are discussed in the chapter on Methods of Teaching.

CHAPTER V

METHODS IN SCHOOL ECONOMY

75. Meaning. — The rules, regulations, and laws governing the conduct of schools constitute school economy. The word economy implies a minimum of waste and a maximum of achievement. For details of this subject see Shaw's School Hygiene, Morrison's The Ventilation and Heating of School Buildings, Kotelmann's School Hygiene, and Dutton's School Management.

76. Space. — At least one hundred twenty cubic feet of space should be allowed for each pupil. The general requirements for recitation purposes, physical exercises, coat halls, etc., vary according to local conditions, but convenience and comfort of pupils and teachers are two essentials in all schools.

77. Light. — The light should come from the left hand side and somewhat above the level of the desk. Light from the right hand side causes the shadow of the hand to fall on the pupils' work; from behind, there is a larger shadow from the head and the trunk; from in front, the light is harmful to the eyes and round shoulders are caused by the pupils' bending down to avoid the direct glare. As a rule, light is permitted to enter from many parts of the room and then curtains or blinds are used to regulate the amount and the intensity of the light.

Ventilation

The average temperature desired is 64 to 70 Fahrenheit.

The aim of ventilation is to remove impure air and replace it by pure warm air. From thirty to fifty cubic feet of pure air per minute are required for each pupil. Some means of securing ventilation from circulation are given in the following sections:

78. Doors and Windows. — To be opened during marching, games, and recreation periods. "Boards, five or six inches in width, placed under the windows are a well-known device. Still better are hoods at the top of the windows, closely fitting the sash, so that when the windows are open from the top the air is deflected toward the ceiling, and is gradually diffused throughout the room without falling too directly on the heads of the pupils."

79. Air shafts. — Shafts leading from outside the building up through the floor to a height of six or seven feet. This height is required so that no draught will be felt by the children.

80. Indirect method. — By the indirect method fresh air is carried into the building through large ducts, containing stacks of radiating surface, and directly into the rooms through registers which are usually placed near the ceiling. The impure air is carried out through a register usually placed directly underneath the incoming air, by means of separate ducts made somewhat larger than those provided for fresh air. Thus a schoolroom, heated and ventilated in this way, has a volume of fresh air constantly entering the room and an equal volume of impure air constantly passing out. — Dutton, *School Management*, page 62.

81. Gravity system. — A gravity system is one where the draught necessary for withdrawing the foul air is caused by a heated chimney or duct. In every large building this method is not adequate or reliable, and ventilating fans are used either as a means of forcing the fresh air into the building, or of drawing out the foul air, or both. — *Dutton*, page 62.

82. Fireplace. — A fireplace is a good ventilator, but not a uniform heater.

Seating

83. Adjustable equipment. — Adjustable seats and desks are the best. The seat should be adjusted at such a height that the pupil's feet will rest on the floor while the legs from the knee to the thigh are at right angles to the trunk. The best adjustable desk has a slant of about fifteen degrees, but it can be raised to a level when necessary. Seats that are not adjustable are usually arranged according to definite sizes.

Decoration

84. Relation to school spirit. — This feature of school equipment has much to do with the spirit of the school. The walls and ceiling should be painted in some color restful to the eye. French gray, pale buff, and light green are approved. A few good pictures should displace a meaningless collection of cheap prints. Maps, diagrams, and the superior work of pupils are legitimate kinds of school decoration. Some teachers hold that maps, diagrams, and pupils' papers tend to distract the class by inviting attention away from the lessons, but a sounder view is that such diagrams have a high educative value from visualization during those periods

when pupils naturally turn from study to relieve their minds. Compare James on mind-wandering, in *Talks to Teachers*, page 114.

Grounds

85. Suggestions from England. — These three paragraphs are quoted from Garlick's, *New Manual of Method*, page 6.

Physical uses. — A playground is the lung of a school. It is as essential to a proper and efficient education as the schoolroom itself. It is the workshop for the manufacture of the sound body, as the schoolroom is for the sound mind. It offers relief after mental work, and brings into play the overcramped muscles. It is a healthy agency for the overflow of that abundant spontaneity of child life, which may become so troublesome to discipline if not regulated.

Its moral uses. — It brings brightness to the school life and helps to engender a love for school by making it popular. It is a fine training ground for the emotions. Boys learn to discipline themselves in their sport, to submit their wills to the will of others. It is a great leveller and compensating force; for the dullard may be a physical adept. He wins in the playground the respect which he cannot attain in the school; for muscle is worshipped as much as brain. The bully is checked, the timid and shy get nerve and confidence by means of the playground's supervised play.

The teacher's work. — Gymnastics should be encouraged by the teacher, and, in the case of boys, a little instruction might be given. Supervision should always be exercised. The presence of the teacher will often tempt a boy to try something which otherwise might be

beyond his inclinations. Games calculated to develop their strength, to give muscular control, to aid the growth of the will, such as our popular games, should be encouraged, sometimes shared, and sometimes directed by the teacher. Many now form and take an active interest in the cricket, football, and swimming clubs of their scholars, and they do not find it unproductive labor.

CHAPTER VI

METHODS IN SCHOOL MANAGEMENT

86. Opinions. — The worth of another man's opinion depends upon how much use we can make of it. Our own judgment becomes the court of last resort. Individualism is praiseworthy in an abstract theory of liberty, but there are times when the common welfare demands the acceptance of opinions of those who are competent to stand as authority. For this reason we quote certain passages.

87. Principles. — The three essential principles underlying school management in New York City are definite responsibility, free discussion, and spontaneity and originality. These essentials were stated by Dr. Maxwell and discussed by him in an address in Brooklyn, November 18, 1904. See sections 88, 89, and 90. These same principles may be applied in any other school system.

88. Definite responsibility. — "The first essential is definite responsibility. There should be a definite field of work, and I believe in looking to the person to whom the work is assigned, to do it, and not bother him in the doing. A principal should give definite work to do in the classroom, and should leave it to the teacher to do it, and not keep nagging her to death."

89. Free discussion. — "The next essential is free discussion. If there is any difference of opinion, I believe the question should be freely discussed among

all grades of officers in schools. By officers I mean the teachers as well as the officers in the Hall of the Board of Education. I have very little use for teachers who come to me and say, 'Tell me just exactly what you would like to have done and I shall endeavor to do as you like.' I like to see a teacher who has the courage of her convictions; who is not afraid to tell me what she likes and what she does not like in the course of study. We are all laboring toward the same end and should be united in the accomplishment of it."

90. Spontaneity and originality. — "Third, I believe in spontaneity and originality. Here in Brooklyn the teachers worked out many things with me which have been copied all over the country, and in many cases all over the world. Such was the method of studying *Evangeline*. We devised a way of correcting compositions which would dispense with that most miserable method of teaching, sitting up nights to mark compositions with red ink. Every one helped, and improvement was made possible by spontaneity and originality. The essential thing in carrying out the course of study is to make a wise selection of topics. Throw the non-essentials in the subjects aside and teach the essentials. Do not exact memorization of long lists of names which are in themselves meaningless. Two limits we must place on spontaneity and originality. We must not allow a person to be so original as to wish to try something which in the past has proved a failure. We must never allow a teacher to make experiments which are beyond all reason. The development of the human mind is subject to law, and it is the business of the teachers to know the laws governing the development of the human intellect. Too often we do not know how or

why certain things are accomplished, the reason of the method or the object of the work; but in comes the philosophy of education to tell us why, to give us the reason, and to hold up before us that high grade of culture and life which it is the object of every good teacher to attain."

91. Qualification of teachers. — Health, scholarship, character, and professional spirit are requisite qualifications of the good teacher. The importance of each of these is not determined by the order stated, nor do we mean to say that other qualities are excluded. Fidelity, sincerity, fairness, sympathy, and other particular characteristics deserve discussion, but our limited treatment makes the four general qualifications include all such particular indications of merit.

92. Maxwell on marking teachers. — As an illustration of one detailed plan, we give in four sections an outline of an address delivered by Dr. Maxwell, June 5, 1902.

How to Estimate a Teacher's Value

Teachers deemed fit and meritorious should be marked A or B; all others, C or D. The A mark should be reserved for teachers of conspicuous ability.

93. Important things in teaching ability.

1. Ability to impart knowledge, or power of exposition. Do not do too much. Talking too much is a common fault.

2. Ability to interest pupils. Without interest, teaching fails to become a part of pupil's make-up.

3. Ability to train pupils to good intellectual and moral habits, *i.e.*, character.

94. Signs of poor teaching ability.

1. Requiring parrot-like repetition of text-book.

2. Most concert recitation is bad.
3. Neglecting pupils' observing and inventing powers.
4. Weak questioning.
5. Neglect in use of object teaching.
6. Waste of teacher's or pupils' time.
7. Rate teacher's scholarship by her mastery of her subject, daily preparation, and interesting application of current events.

Rate effort by her activity in school work and by her efforts to improve by study outside of school.

95. Personality of teacher.

1. Neatness and fitness of dress. No place for old society dresses.
2. Pleasing tone of voice and clear enunciation.
3. Sympathy for children.
4. Decision of character.

96. Control of class. — The only control to be marked meritorious is that obtained by interest in the work. Promise of reward, fear and repression deserve C or D. Repeated presentation of dishonest work by pupils is evidence of unfit control.

Your general estimate of a teacher's ability need not be an average of your detailed marks. Bear in mind that the object of these ratings is not to fill columns with marks, but to do something to raise the teaching force of the city to a higher plane than it yet occupies.

Program

97. Suggestion. — Each school and every class in a graded school should have a daily program posted in a conspicuous place, and that program should be followed closely. This matter is so important that we think it necessary to give specific reasons.

98. Teaching by suggestion. — When the teacher makes a program, posts it, and adheres to it for all periods of work and recreation, there is a silent suggestion for similar order in the life of every pupil. It is indirect instruction; it is suggestion; it is example. The worth of such systematic procedure is valued by pupils, and teachers will soon see that most of the pupils have made a neat copy of the entire program for individual desk use. By using a rubber pen the class program can be made large enough to be seen from any part of the room.

99. The law of habit. — There is no need of blaming pupils for inability to study so long as teachers do not observe the psychological value of habit in studying. If we eat, drink, sleep, or attend to other physical needs at certain times, habit soon becomes so regular that no clock is needed to guide our wants. It is the same in mental habits. The study of mathematics at a certain time puts the body and mind into favorable conditions for mathematics at that time every day, and no great variation in time can be safely made. Likewise for each study and for each recreation exercise on the program.

100. The law of change or variety. — A good program alternates difficult and easy periods, puts memory processes in the morning, and places the shorter periods in the afternoon. This variety is not theory; it is a physical necessity. The problem of fatigue has demonstrated this.

Opening Exercises

101. Justification. — Some teachers think the regular work is so important that no time should be taken

for morning exercises. This is a mistaken opinion. Ten or fifteen minutes in the morning will do more in the real work of education than hours in the facts of mathematics or grammar. Why? Look back to the purpose of education. The pupils enter school each day well or ill, happy or angry, industrious or mischievous, as the case may be. There is lack of harmonious thought and action, lack of bodily and mental poise, lack of self-control. The one thing to do in education is to furnish the environment that will produce the desired conditions of mind and body. Books aside, comfortable position, reasonable silence, respectful attention, — these are conditions required for the morning exercises. These are the conditions that make the school a harmonious unit for the work of the day. Then follow the reading of Scripture or other exemplary books, singing, current events, recitation, declamation, or brief talks by the teacher.

102. Value of habit. — The value of opening exercises in arousing a good school spirit is manifest. A second value is in stimulating punctuality. Habit is here a development; it is always so. Personal experience justifies some of the devices for overcoming tardiness.

The aim is to get the pupils to school in time once so that the process of habituation may be started. Make the pupil conscious of that one success by commending him. Then try some of the motives and means mentioned in the following sections.

103. Memory gems. — Have a short, pleasing memory gem on the board. Have pupils read it together, learn it together, and repeat it together. Social stimulus in this. Learn one or two each week.

104. Desire. — Read a portion of an interesting story two or three times a week. This arouses desire to hear more.

105. Interest in songs. — Sing the old home songs occasionally. Let pupils select the songs.

106. Expectancy: declamation. — Have a short recitation or declamation occasionally. Put title and name of pupil on the board the day before, or simply announce that some one will recite.

107. Monitors. — Appoint tardy pupil a monitor to act before school calls. He will be present.

108. Motives. — Organize for marching, athletics, memory selections, singing, perfect attendance, — something that will arouse class spirit in working under a motive.

109. Anecdotes. — Read or relate an anecdote giving the value of punctuality. Exalt the positive, the good; don't preach about the defects. "My cook," said Washington, "never asks if the visitors have arrived, but if the hour has arrived."

110. The teacher an example. — Teacher always punctual. Have a program and always follow it.

111. Honor roll. — Roll of honor for good attendance.

112. Fellowship. — The school is a social unity and every person in it owes a duty. Think, feel, and act so that no one can assume the right to be tardy.

113. Our platform. — The selection of memory gems is matter that must be determined by the actual needs of the pupils. The platform given below has satisfied thousands of pupils. The use of the word platform invites a comparison or analogy; use civics and history in discussing party platforms.

Our Platform

1. The only way to have a friend is to be one. — *Emerson.*

2. Be not simply good, be good for something. — *Thoreau.*

3. No one can disgrace us but ourselves. — *J. G. Holland.*

4. Heaven never helps the man who will not act. — *Sophocles.*

5. People do not lack strength; they lack will. — *Victor Hugo.*

6. It is well to think well; it is divine to act well. — *Horace Mann.*

7. Whatever is worth doing at all is worth doing well. — *Chesterfield.*

8. Things don't turn up in this world until somebody turns them up. — *Garfield.*

9. He that is good at making excuses is seldom good for anything else. — *Franklin.*

10. I hate to see things done by halves. If it be right, do it boldly; if it be wrong, leave it undone. — *Gilpin.*

11. The chains of habit are generally too small to be felt till they are too strong to be broken. — *Samuel Johnson.*

12. Our greatest glory consists not in never falling, but in rising every time we fall. — *Goldsmith.*

13. He that avoideth not small faults, by little and little falleth into greater. — *Thomas à Kempis.*

14. It requires a good strong man to say: "I was mistaken, and am sorry." A weak man hesitates and often fails to do the right thing. — *Franklin.*

15. Labor to keep alive in your breast that little spark of celestial fire called conscience. — *Washington.*

16. There are two freedoms — the false, where a man is free to do what he likes; the true, where a man is free to do what he ought. — *Charles Kingsley.*

17. Let us have faith that right makes might, and, in that faith, let us to the end dare to do our duty as we understand it. — *Lincoln.*

18. Some temptations come to the industrious; but all temptations attack the idle. — *C. H. Spurgeon.*

19. Look not mournfully into the Past; it comes not back again. Wisely improve the Present; it is thine. Go forth to meet the shadowy Future, without fear, and with a manly heart. — *Longfellow.*

20. Lord of the Universe, shield us and guide us,
Trusting Thee always through shadow and sun!
Thou hast united us, who shall divide us?
Keep us, oh keep us, the Many in One.
— *Oliver Wendell Holmes.*

114. Grading. — The purpose of grading comprehends the welfare of the school, the teacher, and the pupil. For the school, grading is required as a means of adjusting work in the organization or the system. For the teacher, grading establishes a limit for the scope of the teaching. For the pupil, grading is intended as adaptation so that a maximum of progress may be guaranteed. The defects to be avoided are too rapid advancement, tardy advancement, and rigid systems not permitting adaptation to the needs of the pupil.

115. Promotion. — Two aims in promotion are to advance pupils as rapidly as their attainments will permit, and to maintain a standard of approximate uniformity of attainment in the grade. Further consideration will be found in the next ten sections.

116. Class teaching. — In our elementary grades there is much discussion about the relative merits of individual and class teaching, the effectiveness of group teaching, the practical application of the Batavia plan and its usefulness in solving the difficulties of promotion, and, lastly, the separation and the special methods of instructing defective children. This section is inserted here to direct the attention of teachers to these topics. During any recitation period, is the class taught as one unified grade capable of understanding the teacher's presentation? Or, must each class be divided into groups and each group taught separately? Or, must a certain amount of individual teaching be done? Take individual and class instruction, for instance, and you will find that some educators say that the one cannot exist without the other, and that there are no serious difficulties arising under either if the teacher satisfies the ordinary conditions of teaching. This is a suggestive topic for students and we offer as a point of view that no matter how good the teaching may be, there will be some pupils who will present the necessity of individual instruction, either in or out of class.

117. Group teaching. — Group teaching is not new, although it is so considered by some educators. It means nothing more than dividing the class into groups, according to ability, so that three groups, for example, shall be working on three respective kinds of assignment at the same time during one period. The teacher may be giving oral instruction to one group, while the other two are engaged in written exercises. This plan promotes adaptation of matter to the needs of the pupil, and so it becomes only a special illustration of one of

the many characteristics of good teaching. Dr. Maxwell's arguments in favor of group teaching are given in sections 118 to 125 inclusive.

Arguments for Group Teaching

118. General use. — It is now in general use in other cities — a strong presumption in its favor.

119. Adapted to each pupil. — A teacher having, say, only fifteen pupils out of forty-five recite to her at one time is better able to distinguish the individual peculiarities of each pupil.

120. Vigorous teaching. — The teacher being compelled to divide the recitation for each subject into three periods is constrained to conduct the recitation in a vigorous manner. She is forced to avoid the two most serious errors into which teachers fall in the conduct of a recitation: requiring children to recite verbatim, and talking too much themselves.

121. Study periods. — Each pupil has abundant time in which to study in school. Complaints of overwork and excessive home study have practically disappeared wherever the group system is adopted.

122. Concentrated attention. — The pupil learns not only to study, but to inhibit and concentrate his attention — an invaluable experience for practical life.

123. Promotion facilitated. — A pupil may be promoted just as fast or just as slowly as he ought to advance. A pupil may be advanced from one group to another group within a grade; or promoted from one grade to another at any time in the term, without skipping any essential part of the work.

124. No tiresome repetition. — One division should always be composed of pupils advancing more rapidly

than those in the other, so that the teacher will not be compelled to repeat the same lesson on the same day.

125. Difficulties and advantages. — The difficulty is to find profitable employment for the section or sections not having the oral lessons. Many teachers cannot teach unless every child's eyes are fixed on them. They cannot see that more than a minute of this kind of so-called attention is bad for the child. Some teachers find the system hard because they give three-fourths of their attention to the groups not reciting, trying to keep them " in order " and not realizing that more freedom should be allowed children who are working by themselves as individuals. Some teachers believe that we divide classes only because the children have different attainments. They do not understand that we divide classes in order that the nervous strain on the children may be lessened, that they may feel that they are individuals, that they must not waste their time waiting for fifty to get a chance to read aloud or to spell or to compute, and that they may have time to study.

126. Individual teaching. — No matter what devices or methods or novelties may be advocated, the process of true teaching remains a personal relation between the teacher and individual pupils. The most successful class or group teaching is that in which the individuals in the class or group are able to put their minds into sympathetic communication with the teacher's mind, or vice versa. When the successful pupils have passed along with the satisfaction of a good degree of mastery, slow or defective pupils remain for individual teaching to give them the right of promotion. When any pupil fails to understand the instruction, when

disorder interferes with the smooth course of teaching, when illness or other valid excuse causes absence, then there must be a personal meeting of the minds of teacher and pupil to restore conditions to a normal standard of efficiency. So under all circumstances it is safe to argue that individual teaching is the largest factor in the school education.

127. The Batavia plan. — The Batavia plan derives its name from Batavia, N. Y., where it was devised and put into successful operation by Superintendent John Kennedy. This plan of teaching combines the best features of class instruction, group teaching, and individual teaching. The classes are divided into groups according to ability and two teachers are at work at the same time in the same room. One teacher is carrying on the regular work of the grade with the larger part of the class, while the additional teacher is instructing one or more of the backward pupils. As soon as any pupil is capable of doing the next grade work, a promotion is made, no matter what time of the term it may be. This plan of promotion is used all through the elementary schools, and it is found that most of the defects in the ordinary systems of grading and promotion have been overcome in the schools of Batavia. Attention is directed to the special value of the individual instruction under the Batavia plan.

Examinations

128. For pupils. — This topic relates to the examination of pupils although there is equal interest in the nature of examinations prescribed for teachers. A discussion of examinations for pupils is outlined in the next five sections.

129. Methods of conducting examinations.

1. By written tests.
2. By oral tests.
3. By combination of 1 and 2.

130. Advantages of written tests.

1. Self-realization, independence.
2. Habits of industry in preparation.
3. Basis of comparative valuation from time to time.
4. Apperception, composition, correlation.

131. Disadvantages of written tests.

1. Not an accurate index of psychical progress. Other conditions — nervousness, lack of facility in expression, etc. — are too strong.
2. Too much time required from pupils and, later, from teachers.
3. Cramming.
4. Mental deceit: word *vs.* content.

132. Advantages of oral examinations.

1. Time saved.
2. Personality of pupil and teacher united — real teaching.
3. Practical preparation for life. Oral expression, prompt decision, co-ordination of mental powers. *Habit.*
4. Attention and interest.
5. Adapted to individual needs.

133. Disadvantages of oral examinations.

1. Time lost unless teacher is apt.
2. Effects are transitory.
3. Tends to guessing.
4. Do not sustain class concentration.

134. Reviews. — The lack of systematic and thorough reviews is one of the most serious defects in modern education. In their anxiety to cover the prescribed

work, teachers devote most of the time to the presentation of new matter and then pupils are expected to do the extra review and drill work outside of the recitation period. A safer plan is to devote at least two-thirds of the school time to drill or review work; the other one-third will be sufficient for presenting the advanced lessons. The general characteristics of reviews may be considered under the headings in the outlines given in the last section.

135. Home lessons. — It is said that there are five institutional factors in education: the home, the school, the church, the state, and the vocation. The effort to make the home and the school harmonize in relation to lessons assigned in school to be mastered at home is one unsettled problem in elementary and high school work. Many parents object to the assignment of home work on the grounds (*a*) that it is shifting responsibility from the teacher to the parent, and (*b*) that overwork is likely to produce fatigue. The teachers, on the other hand, answer (*a*) that the school hours do not give time to cover the required work, and (*b*) that the habit of independent work is essential in the education of the pupil. For convenience in presenting a liberal view, both affirmative and negative, an outline is submitted.

136. Advantages of home study.

1. Habits: obedience, industry, self-activity.
2. Criterion: honest work is an index of pupil's power.
3. Co-operation: parents become interested.
4. Review: valuable impression and expression of recitation work.
5. Protection: keeps pupils at home.

137. Disadvantages of home study.

1. Habits: incorrect work bad in effect.

2. Not a criterion: too much dishonesty.
3. Friction: some parents disapprove.
4. Fatigue: due to overpressure.
5. Recreation: pupils need outdoor exercise.

Moral Education

138. A contribution from New York City. — These sixteen sections are taken verbatim from *The Course of Study*, 1905.

139. Moral Aim. — It should be the aim of teachers and principals to make the life of the school, in every activity and relation, count for moral education. This aim should vitally affect not only the teaching of every subject and the treatment of every problem of discipline and training, but also the general atmosphere and spirit of the classroom and of the school. In working toward this aim, the following suggestions will be found useful.

140. Personality of teacher. — The personality of the teacher is at the root of all moral education in the school. The teacher's voice, speech, bearing, and dress; the teacher's poise, self-control, courtesy, kindness; the teacher's sincerity, ideals, and attitude toward life, are invariably reflected in the character of his pupils.

141. Reverence. — Reverence is vital to morality. Whatever quickens in children the feeling of dependence on a Higher Power; whatever leads them devoutly to wonder at the order, beauty, or mystery of the universe; whatever arouses in them the sentiment of worship or fills them with admiration of true greatness, promotes reverence. There is no subject studied in school which, reverently taught, may not yield its contribution to this sentiment.

142. Self-respect. — Self-respect, which is also fund-

amental to moral development, is engendered in a child when he does his best at tasks that are worth while and within his power to do well, with proper recognition by teacher and school-fellows of work well done.

143. Principle in character. — The corner-stone of a self-respecting character is principle — the will to be true to the right because it is right, whatever the consequences, to act with firmness in the right as God gives us to see the right. The essential difference between principle and mere self-interest should be vividly brought home to each child.

144. Spirit of school. — The spirit of the classroom and of the school — the spirit that makes children say with pride "my class" and "our school" is one of the strongest of moral forces. Where there exists a proper *esprit de corps*, the problem of discipline is largely solved. Public opinion as a moral force should be moulded and utilized in every school.

145. Social membership. — The child should early gain the idea of social membership. The truth that co-operation and unselfishness are essential to true social living should be made real and vital. This truth is brought home through "group work" where the work of each is necessary to the work of all; and through the feeling in a school or class that the honor of all is in the keeping of each.

The child should also learn that he is a member, not only of the school, but of the family, of the neighborhood, of the city, and of the state and nation. What it means to be a loyal member of these social institutions should be made clear. The naturalness and the necessity of obedience and of helpfulness should be shown. The moral aspect of home tasks, and of working with the

departments of health, parks, street cleaning, police, and education, and not against them, should be enforced by concrete applications. In general, the truth should be impressed that without loyal and effective social membership no individual can lead a complete life.

146. Self-government. — No person has a fully developed moral character until there has been a transfer of the seat of authority from without to within himself; a moral man obeys himself. Each child in every grade should be steadily helped towards self-direction and self-government. Effective means to this end are: appeals to initiative and resourcefulness; the development of such a sense of honor as will preserve order without surveillance; and some form of organization designed to quicken and exercise the sense of responsibility. To trust a child tends to make him trustworthy. A system of pupil self-government, if wisely applied and not encumbered with unnecessary machinery, may be found effective. The form, however, of the organization is immaterial. The essential point is that the teacher, himself a member of the community, should make his pupils sharers to a certain extent in the problems arising out of their community life; and that he should intrust to them as members in their own right of the social body the performance of certain functions. Such training in social activity is effective training for citizenship. Under such conditions "good order" will mean not so much the refraining from disorder as the condition of effective co-operation.

147. Moral values of studies. — Each school study has a specific moral value. Literature and history embody in concrete form moral facts and principles, showing to the child his own self "writ large," furnishing him

with ideals and incentives, and moulding his moral judgment; and they will accomplish these results the more surely as the teacher is himself moved by that which is presented. Every subject involving observation and expression is essentially moral. Every subject, therefore, should be so taught as to make for truth-telling in word and act, and for training in self-expression.

148. Contemporary civilization. — In connection with the regular studies of the school, such aspects of contemporary civilization as are of value for developing the social spirit should receive attention. Hospitals, societies for the prevention of cruelty to children and to animals, homes for orphans and for the aged and infirm, fresh air funds, and similar agencies for social service should be brought within the child's comprehension as opportunity offers. Deeds of heroism and self-sacrifice done by firemen, policemen, soldiers, and other persons, should be presented and commended. The truth that success in life means more than mere money-getting can thus be brought home again and again. The contemplation of deeds of cruelty, dishonor, and shame has a necessary, though subordinate, place in moulding moral taste.

149. Topics for moral lessons. — The following list of topics affords subjects for many practical lessons in morals and manners:

1. Duties to parents, brothers, sisters, and playmates; to servants and other employees; to employers and all in authority; to the aged, the poor, and the unfortunate.

2. Conduct at home, at the table, at school, on the street, in public assemblies and in public conveyances.

3. The common virtues, such as regularity, punctuality, self-control, cheerfulness, neatness, purity, temper-

ance, honesty, truthfulness, obedience, industry, and patriotism.

Principles of Moral Instruction

150. Development. — The course of moral training is a development, in which the child is first led to act rightly and afterward to work from principle; he proceeds from obedience on faith to obedience on principle; from regularity to faithfulness. The child also develops from egoism to altruism. His impulse toward self-interest normally develops earlier than his impulse to put himself in another's place. Upon the full development of the former stage depends the full development of the latter.

151. Cultivation of imagination. — The culture of the imagination is a powerful aid in moral instruction; first, as the power vividly to picture consequences — to put yourself in your own place later on (foresight); secondly, as the power to "put yourself in his place" (social imagination, sympathy).

152. Employ self-activity. — In using literature and similar material for purposes of moral education, the teacher should not violate the law of self-activity. The child may resent having a moral drawn for him which he can draw for himself. He is the more likely to follow the principle which he himself discovers or formulates because it is his own.

153. Positive vs. negative. — The most effective method in moral education is positive rather than negative. A mind filled with worthy interests, high ideals, and helpful activities has no room for evil. Approbation more than censure leads to well doing. Love is a stronger and a better motive than fear.

154. Supremacy of law. — At every stage of school life pupils should be taught that they live under inexorable laws which they cannot violate with impunity — both physical laws and moral laws. Obedience is not optional: it is compulsory. Penalty follows law-breaking as surely as night follows day, though the penalty is not always immediate.

155. Discipline. — Discipline in school management has reference to mental, moral, and physical training that tends to secure the self-control of individuals. The general use of the term discipline in regard to human faculties means training that enables a faculty to do more efficient work than it would have been able to accomplish without the discipline. So in a larger sense disciplinary school management aims to develop all the useful characteristics of good citizenship.

156. Authority. — There are writers and teachers who hold that respect for authority is not an American ideal. We do not agree. Constituted authority, wherever it may be, deserves constant recognition and respectful obedience. Authority is not tyranny; it is a natural and necessary guarantee of order in moral, religious, and civil life. The largest development of individual freedom is impossible without some accepted standard of authority. Pupils should be taught, then, that it is their duty to respect and obey the authority in the school, in the home, and in the community.

157. Co-operation of parents. — In another section of this chapter we have spoken of the five institutional factors in education. One aim of ideal training must always be to get those five factors into harmonious co-operation. It is not always possible to secure such assistance outside of the home, but it is possible to bring

the parents into close touch with the actual needs of the school. This may be done by correspondence if it is not convenient to have personal consultations in the homes of the pupils. A visit has many advantages over correspondence because it is possible for pupils, teachers, and parents to meet in common and establish a balance of opinions relating to favorable and unfavorable work in the school. A third means of getting into touch with parents is patriotic exercises or other school entertainments. The natural interest in the welfare of the pupils on such occasions is the strongest inducement to parents to present themselves at the place where the entertainment is to be held. Other means of becoming acquainted are found in churches, local societies, and other established means of social intercourse in the community.

Punishment

158. Definition. — Punishment is a penalty for the violation of the rules of order. The old idea of punishment embodied the necessity of giving the pupils an equivalent for the wrong that had been done. The modern view of punishment looks to the reform of the pupils through the cultivation of desirable habits of activity.

The tendency in theory and practice is against corporal punishment. What, then, can be substituted? As some penalty is in accordance with the supremacy of law, as expressed in section 154, we shall discuss some approved kinds of punishment.

159. Detention. — The practice of keeping pupils in the schoolroom at recess, during part of the noon or after school, has the approval of many educators

although it is severely condemned by others. The loss of pleasure seems to be the basis of the punishment. One serious objection to detention is on the physical side. If the pupils were allowed the privileges of physical exercise during the recess periods, it is probable that some of the sources of disorder would find a natural outlet in the games. The pupil who is detained is not likely to be in a frame of mind suitable for continuing the work of the day after his companions return to the classroom. For these reasons detention cannot be widely approved as a form of punishment.

160. Assignment of extra tasks. — The aim of this kind of punishment seems to be the development of intellectual power through the extra work. It is implied that the mental training will ultimately direct the child into points of view that will cause him to desist from further wrong-doing. On the other hand, the imposition of extra school work is likely to lead the child to dislike that kind of work and also to form habits of carelessness in performing the assignment.

161. Demerit marks. — This penalty assumes that pupils are ambitious to secure high standings as an indication of proficiency. Some pupils do have such ambitions, but their ambitions are easily crushed as soon as one demerit mark appears upon the record. Other pupils care nothing for marks of that kind and so the punishment is wholly external and has little or no effect upon them.

162. Expulsion. — This should be used only as an extreme means of settling the difficulty. Expulsion is justified only when the pupil reaches a state of rebellion which cannot be treated without an injury to the class or to the school. Then it is considered prudent to

remove the pupil from the presence of his companions. An adverse view of expulsion lies in the fact that the child expelled is to be at liberty in the community and his idleness is likely to lead to the development of bad habits. The relation of idleness and crime shows the futility of expulsion as a form of punishment in any community.

163. Incentives. — The ordinary incentives are marks for scholarship or conduct, prizes, decorations, school privileges, and public commendation. Some of these are forbidden in certain school systems because of the difficulty in doing justice in selecting the best pupils, or because such distinction tends to develop egotism and selfishness in place of altruistic virtues. These incentives are called artificial.

In contrast to the artificial incentives are the natural incentives. The latter are respect for teacher, respect of class, school spirit, sharing school privileges, and personal satisfaction in doing one's duty. These are natural because they are human. Each incentive develops a stronger feeling between the pupil and some other member of the school. The benefit is the consciousness of personal power growing out of self-activity. Notice how the community interest promotes attention, interest, and activity.

164. Self-government of pupils. — All education aims at self-government of the pupils. The specific use of the word here relates to the various forms of pupil government, in which the pupils themselves participate in the legislative, the executive, and the judicial departments of school organization. In each system of this kind, the government is a republic. The School City and the School State are common forms.

165. Public opinion in school. — Disorder in school is sure to arise if confidence is not established in the motives of the teacher and of the pupils. It is a mistake for a teacher to think that a large number of pupils like to do wrong; and it is unfortunate for pupils if they cannot consider their teacher a friend. The establishment of mutual confidence, the pleasure of morning exercises, the satisfaction of success in the studies, the interest in rhetorical exercises, and the fellowship of the school grounds and the afternoon walks, — all these will tend to develop a healthy public opinion in school.

166. Evils. — Such school evils as carelessness, laziness, tardiness, truancy, whispering, lying, cheating, stealing, impudence, and rebellion should be displaced by desirable habits. Repression is only a temporary suspense; substitution is the sound process.

167. Virtues. — The desirable habits to be substituted in section 166 are accuracy, industry, neatness, politeness, truthfulness, honesty, justice, punctuality, co-operation, and obedience. The substitution is a matter of gradual habituation.

168. Affiliated interests. — In speaking of natural incentives, in section 163, we referred to the sharing of school privileges. Such privileges are found in the affiliated interest which serve as useful means of education in addition to the work of the recitation. The various athletic interests, the debating clubs, the school paper, the musical and dramatic associations and the alumni associations are all helpful in keeping a strong school spirit.

169. Adolescence. — Independence is a mental characteristic of adolescence. Management during this period is guidance. Follow these suggestions:

1. Environment must be adapted to pupil rather than vice versa.

2. Physical health is a predominant consideration.

3. Pupils need direction and inspiration rather than ponderous knowledge.

170. Fatigue. — During adolescence growth is so rapid that strength is not constant. In younger children, fatigue is produced by other causes. So far as fatigue relates to management, it shows the necessity for finding and removing physical causes of disorder.

171. Devices in management.

1. Use quotations. See Our Platform, section 113.

2. Ask pupil to write an opinion of his own case. Furnish two or three questions to guide him. Assign to be done at home. This causes introspection.

3. Have pupils write a letter of advice to themselves. They will unconsciously expose their own weaknesses. This aid will show what treatment is best.

4. Ask pupils to write a letter of advice to the pupils in the class one grade below. This work will bring out virtues and vices under the pupils' point of view.

5. Assign a composition on "My Favorite Teacher." The literary merit may be less interesting than the enumeration of certain characteristics not admired in the teacher who assigned this theme. But whatever the opinions may be, this device is one more way of helping pupils to the habit of justly measuring themselves in relation to others.

CHAPTER VII

METHODS OF TEACHING

172. Definition. — By method is to be understood that body of principles drawn chiefly from a sound psychology, which are applicable to all teaching; by methods are to be understood the special plans and devices to be used in teaching a particular branch or subject. — Roark, *Psychology in Education*, page 267.

A method of teaching is a series of teaching acts so arranged as to attain a definite end or result. — White, *Elements of Pedagogy*, page 137.

Method is a guidance of the process of adapting culture material to the needs of the child. — Monroe, *Text-Book in the History of Education*, pages 749–759.

Thus we see that in speaking of method or methods in education, we must consider an orderly procedure determined by three factors — the teacher, the nature of the subject-matter, and the needs of the pupils. The procedure is not so changeable as a manner nor so narrow as a device; it is as broad as the nature of childhood, as fixed as the laws of race development, and yet as flexible as the needs of individuals. Methods should be thought of as a process embodying the blended movements of the minds from definite stages of development toward the ultimate possibilities in life. Thus we can set aside the old conception of method as a rigid standard to which all pupils must conform, and in its place

establish the pedagogical ideal of method as a guiding process that stimulates initiative, enlivens motive, and directs all activities toward desirable habits for life.

173. Classification. — The attempt to classify methods of teaching under twenty headings is a source of confusion in theory and practice. The real difficulty lies in the fact that so many teachers think that each classified kind is a distinct method of teaching. While this misconception may be removed after a few terms in the schoolroom, is it not economy for a young teacher to know at the start that one recitation may include all the known methods? In other words, tact fits the need. If we emphasize six kinds as comprehensive, all the other kinds can be subordinated. The six are analytic, synthetic, inductive, deductive, topical, and Socratic. A better classification, but somewhat in advance, is these four: analytic-synthetic, inductive-deductive, topical and Socratic. The full list is given, however, so that students may suit themselves.

174. Conversational method. — This method is a natural intercourse between teachers and pupils. While its use is generally restricted to lower primary grades, it may be used in higher work. Its success depends largely upon the personality of the teacher. Speaking in ordinary tones is an indication of natural poise, and pupils will gladly adapt themselves to similar phases of thinking and doing. It is a method that inspires confidence, invites co-operation, and makes the educative process a matter of personal communication between teacher and pupil. It was the method of Pestalozzi, Froebel, and Colonel Parker. It is frequently called a dialogue method.

175. Development method. — This is another dialogue method whose use extends over the whole field

of education. It is especially adapted to early information lessons which aim at clear concepts and easy expression. Its aim is to develop right habits of thinking; and by the use of suitable material, the child's interest is aroused so that the matter, the method, and the result have educative value. A further study of methods will show that this method really includes many others, such as, particular to general, known to related unknown inductive-deductive, etc. You will see that these methods shade into one another; they are not so many distinct methods.

Caution. — Do not try to develop everything. If pupils give you the answer before you are half way along in your place of development, don't deaden their interest or waste your time by completing the developing process on that lesson.

176. Lecture method. — This is useful in intermediate and higher grades, especially where the matter is brought up for discussion and other reproduction in succeeding recitations. A kind of lecture or monologue method is required in all primary classes before text-books are introduced. Narration, description, explanation, and definition are given by the teacher as models for imitation and reproduction. But let it be understood that the lecture method, strictly interpreted as a lecture, is suited only to mature minds.

Questioning

177. Bases. — The attempt to classify questions under the headings development, drill, review, examination, etc., is putting considerable value upon external form again. There are differences, of course, but the tactful teacher may use all these kinds of questions in

any one lesson, even though the lesson is strictly a development lesson. If sound methods of teaching must always depend upon three factors — teacher, lesson, pupil — then sound questioning depends upon these same three factors, and the teacher will adapt the questions to the needs of the children.

178. Consecutive questioning. — This plan follows the order of seating or roll. The advantage is economy of time, and this advantage is potent under a strong teacher. The disadvantages are inattention in class and possible lack of preparation of assigned work, especially by the pupils who can foresee their exemption from obligation to recite. These adverse criticisms presuppose a lack of working spirit in the class and a certain defect in the teacher.

179. Promiscuous questioning. — This method of questioning is that in which the teacher does not follow order in seating or the order of the roll, but calls from different parts of the room as his fancy dictates. The advantage of this method is said to be in the fact that no pupil knows when his turn will come and so all are presumed to be giving attention. The fact that a pupil has recited does not justify him in thinking that he will not be called a second or a third time. The disadvantage in the method lies in the loss of time in calling the names, in the exemption of certain lazy pupils, and in the probability that the best ones in class will be called upon more than those who do not show the same amount of eagerness to recite.

180. Simultaneous questioning. — The simultaneous method of questioning is that in which questions are directed to the whole class and pupils are given time to think what the answer will be. Then the whole

class or one pupil may answer the question while the others are thinking or answering with him. The advantage of this method is said to be that the attention and the interest of all pupils are held during the time of asking the questions. In those cases where it means concert recitations it is possible that a large number of the pupils are not giving the required thought, attention, and answers as the general tendency seems to indicate.

181. Development questions and review questions distinguished. — Development questions require more time in asking and answering; the order is generally logical; the answers are in complete statements. Review questions are rapid; not necessarily in logical order; answers may be brief.

182. Rules. — A few rules for questioning will not be out of place. They may be stated as positive or negative rules.

183. Positive rules.

1. Questions should be adapted to the powers of the pupils.

2. The wording of the question should be simple, clear, specific. This rule is opposed to puzzles, vague questions, double questions, universal questions.

3. The order of the questions should be determined by the law of successive clearness. Questions logically arranged are not always suited to the child's mind. Question to promote progressive clearness in the child's thinking.

4. Make the question as short as clearness will permit.

5. Question to impress what the children know, not what they don't know.

184. Negative rules.

1. Do not end a question with what.

2. Do not ask questions that allow a choice of answers.

3. As a general rule, do not ask questions that can be answered by yes or no.

4. Do not ask a question that suggests the answer.

5. Do not abuse the use of personal pronouns in questions.

185. Weak questioning. — Some questions to be avoided may illustrate the rules under sections 183 and 184.

1. Vague questions. How was the battle of Gettysburg fought?

2. General questions. What do you think I saw on my way to school?

3. Obscure questions. Can you comprehend the complexity of civilization?

4. Double questions. Where was Taft born and what service did he render in the Philippines?

5. Universal questions, similar to general questions. Where is London?

6. Involved questions. Considering the facts in the Missouri Compromise, can you, a student of modern civic problems, trace the results in relation to the principal causes?

7. Direct questions. Was Burgoyne successful at Saratoga?

8. Elliptical questions. The best kind of questions is—?

If any omission in a question causes a pupil to give more energy to the meaning of the question than to the answer, the question is defective. On the other

hand, alertness may be stimulated by ellipses in rapid review questions.

186. Socratic method. — This method is a specific kind of questioning. As used by Socrates, it was conversational in tone. He elicited statements from others by two kinds of questions: one to convince of error; the other to develop truth. Socrates was questioning the Sophists who assumed to be masters of all knowledge and so the first part of the Socratic process was destructive and ironical. Its purpose was to overthrow and ridicule the wrong opinion held by the pupil. The second part of the process was directing the mind by its own activity toward the truth, and preparing the mind to recognize and accept the truth.

187. Value of the Socratic method. — The Socratic method accepts the pupil's point of view in thought and language; it keeps within the scope of the pupil's comprehension; every movement in thought necessitates self-activity of the pupil; it leads into a discovery of the new viewpoint, but it does not tell; it leaves the pupil at the threshold of truth, but does not force him to accept it. It is conviction through directed activity. Sometimes called maieutic, *i.e.*, giving birth to ideas.

188. Irony in Socratic method. — Irony cannot be safely used in teaching. Encouragement, not sarcasm, is what the average pupil needs.

189. Limitations in use of Socratic method. — The Socratic method is adapted to all knowledge in which the pupil's experience is sufficient to enable him to reach the truth. Beyond this limit it is not useful.

190. Illustration of Socratic questioning in mathematics.

Meno. Socrates, we come to you feeling strong and

wise; we leave you feeling helpless and ignorant. Why is this?

Socrates. I will show you (calling up a young Greek and making a line in the sand). Boy, how long is this line?

Boy. It is a foot long, sir.

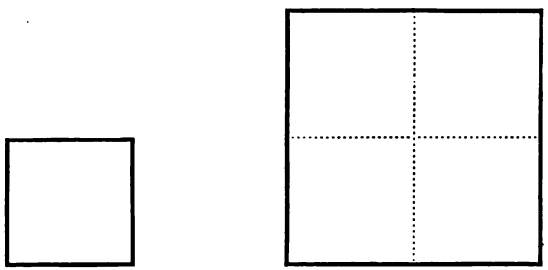
Socrates. How long is this line?

Boy. It is two feet long, sir.

Socrates. How much larger would be the square constructed on the second line than on the first line?

Boy. It would be twice as large, sir.

Under the direction of the boy, Socrates constructs two squares on the sand, thus:



Socrates. How much larger than the first did you say the second square would be?

Boy. I *said* it would be twice as large.

Socrates. But how much larger *is* it?

Boy. It is four times as large.

Socrates. Thank you, my boy, you may go. Meno, that boy came to me full of confidence, thinking himself wise. I told him nothing. By a few simple questions I led him to see his errors and discover truth. Though really wiser, he goes away feeling humbled.

191. Illustration of Socratic questioning in grammar. — Take a familiar answer in sixth grade grammar, using this sentence: Lincoln was very kind to children. Teacher asks a class to tell part of speech of every word in the sentence. A pupil says very is an adjective.

Teacher. You say very is an adjective.

Pupil. Yes, very is an adjective.

Teacher. Why do you call very an adjective?

Pupil. Because very modifies an adjective.

Teacher. What adjective does very modify?

Pupil. Very modifies the adjective kind.

Teacher. You have told me the use of the word very. After finding the use what led you to say adjective?

Pupil. I thought of the definition of an adjective.

Teacher. Give that definition.

Pupil. Anything that modifies a noun or a pronoun is an adjective.

Teacher. What noun or pronoun does very modify?

Pupil. No noun or pronoun. Kind is an adjective.

Teacher. Now, what is your conclusion?

Pupil. Very is not an adjective.

Teacher. Then what part of speech is it?

Pupil. Anything that modifies an adjective must be an adverb; hence, very is an adverb.

192. Another illustration of Socratic questioning. —

Teacher. Define a straight line.

Pupil. A line that doesn't slant.

Teacher. Draws slanting line on board. Is that a straight line?

Pupil. Yes.

Teacher. Does it slant?

Pupil. It does slant.

Teacher. What is the matter with your definition?

Pupil. It is not accurate.

Teacher. Why not?

Pupil. A straight line may slant and still be straight.

Teacher. Correct your definition.

Pupil A straight line is the shortest distance between two points.

Answers

193. The kind wanted. — The kind of answers given by pupils will depend largely upon the nature of the questions asked by the teacher. When all the conditions are adjusted to insure a fair amount of effort, the answers are an indication of intellectual progress. We shall discuss this topic under four headings.

194. The educational value of answers. — The test can be found in the methods of mind training treated in chapter IV. A good answer is evidence of clear percepts, serviceable memory, good concepts, and some application of judgment and reasoning. Furthermore, a good answer is evidence of attention; it may indicate interest; it must utilize apperception; and it requires self-activity. One good answer is the beginning of habituation. Other good answers will, of course, tend to fix desirable habits of mental activity.

195. Characteristics of good answers. — From what has just been said it is evident that a good answer requires the child to do some thinking. He must think to get a correct interpretation of the teacher's question and he must think again to furnish material for his own answer. Then follows another quality, namely, the use of good language in clearly expressing the answer.

196. What answers should be received. — First, the good answers just characterized; second, answers which

are partially correct providing there can be a division made in the answer required. This view is the one that gives credit for all that the pupil is able to do. The third kind of answer to be accepted is the one that is evidence of fidelity on the part of the pupil. The answer may not be correct, but the effort to make a correct answer deserves some commendation. Strictly speaking, a correct answer is the only one that can receive full credit in the recitation, but as the process of teaching does not expect a satisfactory answer to every question, it is suggested that the other two kinds of answers receive some credit as the means of encouraging the pupils.

197. What answers should be rejected. — Dishonest answers, guesses, and careless answers should not be accepted. They may satisfy certain standards of marking, but they are not educative. Dishonesty may be due to laziness; or it may be a kind of unconscious development in schools where per cents have been used as the goal of education. In all these cases, require the pupil to work toward the desired answers. This is the only positive cure. A negative treatment may place a zero upon the register, but a zero does little or nothing to direct the average pupil into habits of useful effort.

198. From the particular to the general. — This process was emphasized by Pestalozzi in these words:

"It is a chief business of education to pass from distinctly perceived individual notions to clear general notions." Individual notions are notions or ideas of individual things. Each of the five senses furnishes sensations which the mind may or may not accept. As soon as the mind considers sensation by examining the object that caused the sensation, the mind gains a

percept of that object. This percept may be considered a particular or individual notion. Then the memory and the imagination work on these percepts, until the mind combines the percepts into a concept or general notion.

In all early education the teacher strives to train the senses to see things, to observe things, so that the mind may get clear, accurate percepts as the foundation of knowledge. Concrete material in teaching is useful because the pupils can use more than one sense in observation.

Illustration

To teach the definition of a noun, write sentences on the board.

Longfellow was a poet.

Pupils like poems.

Lincoln loved children.

Do you know nouns?

The presentation will lead pupils to see that each name word in these sentences is a noun; and so from seeing particular name words are nouns, they infer that in general name words are nouns. So this inductive lesson proceeds from the particular to the general. The same process is found in all elementary development lessons.

199. Simple to complex. — The meaning of these words varies as individuals vary. We must take each child's point of view. What is simple for the teacher may be complex for the pupil.

1. In language work, the simple things are the things the child knows. Talk about toys, pets, experience. Use short, simple, familiar words.

2. In learning numbers, the process of scoring is a simple way of indicating a knowledge of the number concept, thus: 11 for 2 or two; 111 for 3 or three.

3. The simple sentence is mastered before the compound or the complex.

4. In music the natural scale is taught first.

5. In nature study the plant as a whole is studied as one single, simple, living thing. Later the child will become familiar with the complex structure of the plant and the functions of its various parts.

200. Concrete to abstract. — The abstract concepts cannot be formed without first having a concrete concept. Thus, an abstract concept of whiteness comes after associating whiteness with a number of white objects. Another reason for using objective or concrete teaching is the demand for multiple sense instruction. Seeing, hearing, feeling, and even tasting and smelling may be employed.

1. Alphabet blocks as play in education.

2. Warlike toys for Spartan children.

3. Foot-rule and yard-stick in linear measure; gill, pint, quart, and gallon measures in liquid measure; ratio and proportion by handling blocks in Speer method.

4. Moulding-board, putty maps, relief forms, and pictures in geography.

5. The study of a model to get form, style, and rules in composition.

201. **From the known to the related unknown.** — A child is master of considerable knowledge when he enters school. This knowledge in possession must be used as apperceiving groups as a basis for new knowledge. The adaptation of the old and the new will utilize interest and attention.

1. The schoolroom, the playground or the city may each or all be used in early lessons in geography. This plan illustrates from the particular to the general.

2. From knowing the agreement of subject and predicate, the child passes to concord of adjectives and nouns, pronouns, and antecedent, etc.

3. Unity in a sentence is a foundation for unity in paragraph and essay.

4. Definition of a verb is necessary for an understanding of the participle, and the nature of nouns and adjectives leads to the secondary nature of participle.

5. The common denominator for addition of fractions opens a way to subtraction and division of fractions; and common fractions in general are a basis for decimals and percentage.

202. Observation before reasoning; processes before rules; facts before definitions or principles. — These axioms are a demand for inductive processes in teaching. They are justified by psychology because percepts precede concepts, and definitions require related classes. Discovery aids activity.

1. Window gardens are means of causing the child to discover the relation of light, heat, and moisture to plant life.

2. Five or more examples worked in multiplication of decimals will lead to the rule.

3. Actual experiments with levers will quickly impress the rules regarding fulcrum, weight, and power.

4. See also inductive method.

203. From the empirical to the rational. — Science is organized knowledge; and before knowledge can be organized, some of it must be possessed. Every study therefore, should have a purely experimental introduc-

tion; and only after an ample fund of observations has been accumulated, should reasoning begin. — Spencer, *Education*, Chapter II, page 93 of Kellogg's edition.

So this rule means that knowledge must be gained wholly by personal experience. It embodies all of the other preceding axioms. We admit that pupils should learn much by their own efforts, but all subject-matter cannot be mastered in this way. Some must be taken on the authority of the teacher, as the deductions in history, economics, and advanced mathematics and science. Our criticism is that the rule should not be absolute because all subjects do not admit personal experimentation.

204. Heuristic method. — This name is derived from a Greek word meaning to find; and so it is a method of directing instead of telling. By questions, directions, problems, and suggestions the child is encouraged to find out everything for himself by discovery. It is a constructive method which aims to promote self-realization. It is the method of discovery under sympathetic and intelligent guidance.

Illustration

A class is beginning the study of Asia. Without any lecturing by teacher or reading by pupils, turn to the map of Asia. Each pupil has a geography. Take a general view of surface; location, direction, and name of mountains. Next take drainage; rivers, running north, east, and south; hence, three great slopes; highlands and lowlands contrasted and located. Coast line, peninsulas, harbors noted. Conditions affecting climate and the probable modifying elements. Probable occupations, productions, and consequent states of civilization.

The second process is verification. Observation and inference in the first process beget lively interest and active thinking, and then the verification by consulting the printed pages completes the first period of study. Contrast the old memory exercise in studying Asia. See last two sections in chapter on geography.

205. Prussian method. — Hinsdale says that "teaching is bringing knowledge into due relation with the mind." In the effort to induce pupils to share willingly in all the activities of the school, the Prussian method puts the pupils and teacher under a feeling of equality in a kind of social participation. For instance, a lesson covers eight problems in arithmetic. All pupils are equipped for written work at desks. The teacher calls for the interpretation of the first problem, and several pupils in turn contribute their opinions. This arouses the social stimulus or the general feeling in favor of individual and class success. All begin the written solution; one is called to explain a step, another explains a second step, and so on. After reciting, each one continues his written work. So every step is explained in interpretation, solution, and analysis; every pupil has shared in oral and written work; every problem has been solved and all the difficulties have been cleared away. The tone is conversational, the manner is natural, the work is interesting in process and results, and the spirit of a civic community has been experienced by all. This kind of education is living, and not a mere preparation for living.

206. Inductive method. — A process of reasoning which establishes a general rule, definition, principle, or proposition based upon the knowledge of particular cases. In chapter IV we explained briefly that the nat-

ural order in acquiring knowledge is percepts, concepts, judgments. This order is said to be the order of race development. Primitive man learned, through concrete and individual experiences, certain facts which he later formed into general conclusions. For example, flint is good material for arrow-heads. Such knowledge became a general possession and each generation added to the general fund of knowledge.

Illustrations

Solving several examples in division of fractions and then deriving the rule for inversion of the divisor; studying sentences containing relative pronoun and antecedent, and then constructing a rule showing that the pronoun and antecedent need not agree in case; beginning the study of history at seven o'clock every school day for two weeks, and then noticing that the mind has formed a habit or rule of thinking about history daily at that hour.

207. Deductive method. — A process of reasoning that starts with general rule, definition, principle, or proposition and shows its respective application to particular cases. Thus in teaching grammar, have pupils learn definitions first and then apply them; in arithmetic, learn rule and then work examples; in geography learn definitions of land forms and later look for illustrations.

208. The inductive-deductive method. — Neither induction nor deduction can alone constitute a suitable method in a complete act of instruction. The two must be combined. On account of this necessity, some writers mean inductive-deductive when they use the term inductive method. Let the student remember, then, to combine these two processes in every development lesson.

A second point to be remembered is that these two methods are justified by psychology; they satisfy the working of the mind. Teachers hear much about the action of the mind in passing from particular to general and then from general back to particular. In developing the definition of an adverb, the teaching emphasizes several adverbs in sentences. A knowledge of each adverb is a particular notion. Then the mind generalizes these particular notions and expresses the general notion in a definition of an adverb. But this does not complete the process; the impression is not deep enough. In other words, this definition must be applied to other adverbs in sentences, and pupils must construct sentences containing adverbs. This application or drill completes the educative process by passing from the general to other particulars. Thus the inductive-deductive method makes a complete mental act in every development lesson.

209. Analytic method. — This method proceeds from wholes to parts. In grammar, begin with sentence and proceed to parts of sentence. In literature, study the whole selection before considering paragraphs, sentences, and words. In primary reading, begin with sentence and go to words, letters, and phonics. In nature study, observe the plant or other material as a whole before studying its parts.

210. Synthetic method. — The synthetic method proceeds from parts to wholes. In grammar, begin with words and build sentences. In primary reading, the building of phonic elements into words is synthesis. In primary geography begin with the schoolroom, having the children make a map of it and understand how a map represents an object; thence proceed to the

schoolyard, the street, the city and show upon the city and state maps all the children have themselves observed, including rivers, hills, mountains, etc.

211. Comparison of analysis and synthesis. — Both relate to the action of the mind in dealing with individual things and the parts of those things. Analysis seeks to show the relation between the parts; synthesis emphasizes the parts themselves and later shows their relation in construction. Both processes are required in every complete mental act.

Important Distinction

212. Individual things vs. classes. — There is a common misconception about the difference between the inductive-deductive method and the analytic-synthetic method. Analytic teaching is considered identical with deductive teaching, and synthetic teaching with inductive teaching. This is an erroneous idea. Analysis and synthesis are employed in dealing with single things, and their parts — a word and its letters, a sentence and its elements, a method in reading and its steps, a subject like arithmetic and its constituent processes; induction and deduction are employed in dealing with more than one thing in working to or from classes or generalization. The inductive method does begin with one thing, not so much to ascertain the nature of the thing itself as to find the larger class in which the one thing belongs; and while the inductive comparison of one thing with another may seem to be a synthetic process, let it be noted that synthesis seeks to put the constituent parts of one whole into proper relations, but induction seeks to put several wholes into a proper classification. Likewise analysis is confined to the relations between one

whole and its parts, while deduction passes from the large classification of many wholes down to the application to one thing. In other words, analysis and synthesis deal with individual notions, individuals or single things; induction and deduction deal with general notions, or classes.

213. Topical method. — Subject-matter may be divided so that each heading will include material for a unit of discussion. The ordinary division into chapters does not always suit the requirements for class assignment or for individual discussion. A topic should be complete in itself and yet be one of the related parts in a larger division.

The advantages of the topical method are convenience in assigning lessons, definite responsibility in recitation, and independence of pupil in thought and expression. The disadvantage comes only from abuse in which facts are disconnected and class stimulus is sacrificed to individual achievement.

214. Discussion in class. — The topical method suggests the important topic in this section. As it is frequently an examination question, an outline is suggested in the next four sections.

215. Advantages of discussion in class:

1. Aids in retaining attention.
2. Pupils learn to express thoughts without direct question.
3. Teacher can get a broader insight into pupils' method of thought and general knowledge and associations.
4. Pupils may have a keener feeling of responsibility concerning the success of the lesson.
5. Fear of error is at a minimum.

6. It is an inducement to thorough and comprehensive study, volunteered information, etc.

7. Is not so restricted as a direct answer to a question.

216. Dangers in discussions in class.

1. The bright and precocious will monopolize the time.

2. The lazy, careless, and indifferent take a vacation.

3. Wandering from subject.

4. Loss of logical sequence of thought.

5. Disproportionate emphasis of minor points.

6. Confusion of ideas due to lack of clear and definite statements and the variety of answers.

7. Encourages guessing.

217. Directions for creating and profitably conducting a discussion.

1. Arouse interest in the question by association with previous ideas or by a healthy spirit of emulation, etc.

2. Get various opinions even if an excellent answer has been given.

3. Put the children on their mettle by speaking of the excellence of certain remarks.

4. Encourage independent ideas by catching those who answer by following sheep fashion.

5. When there is danger of guessing put a pointed why? or how?

218. Characteristics of effective discussion:

1. Interesting subjects.

2. Unity of idea.

3. Alertness.

4. Subject alive with associations, concepts.

5. Calls for thought.

219. Text-book method. — This name was formerly given as a kind of reproach to teachers who followed

the matter and method of text-books. A reaction went to the other extreme of oral teaching. Now educators are trying to secure a reasonable average.

The abuse of the text-book method required verbal memory of the contents. The extreme oral teaching has made pupils dependent upon the teacher. Pupils have become passive on account of not knowing what to study, where to find it, and how to study.

Text-books should be used, and the prudence of teachers is a safe guide in avoiding extremes.

CHAPTER VIII

GENERAL METHOD

220. Device, method, general method. — In the discussion of methods of teaching, there is not enough distinction between a mere device and a method. A device is simply a tactful presentation of some part of the lesson. It is generally personal, particular; it may or may not work well with another teacher under different circumstances. For instance, in teaching about a lock in a canal an ingenious teacher may have a wooden model made by himself or a pupil. This is strictly a device, and a commendable one, but not properly a method although it is entitled to classification under objective or concrete methods of teaching. Again, a teacher makes a chart of figures covering the ordinary combinations for rapid drill. It is a good device, but it is not a method.

We have described some of the methods which are useful in regular teaching. Now we come to consider whether there is one general method that is applicable in all teaching. If there is such a general method, it must be that there are general psychological laws which apply to the development of all human beings. We think there are such universal principles or laws and there is one general method. Right here we may emphasize a thought suggested in the preceding chapter in regard to the desirability of eliminating several kinds of

methods by making a better classification. Strictly speaking, method in education is one composite process embodying all of the methods described in chapter VII. This view is upheld in a book recently published, Colgrove's *The Teacher and the School*, page 319: "In spite of all the diversity of subject-matter, text-books, school surroundings, and teaching devices, in spite of all the differences in age, acquirement, and individuality of pupils, there is a truly typical method of teaching which is, in the main, constant and capable of being adapted to nearly all subjects and classes. And this is so because the major movements of the mind are so common to all learners and because the fundamental laws of teaching, based as they are on the nature of the mind, are valid for all subjects and find application in every recitation."

221. Herbartian view of the order of the mind. — "No matter what the study may be, whether Latin, mathematics, science, or some other, the mind follows a certain order. Through the old related experiences (first step, *preparation*) new individual notions are reached (second step, *presentation*); these are compared and their essential characteristics abstracted (third step, *comparison*), and the resulting general truth is worded (fourth step, *generalization*); this generalization finally receives application (fifth step, *application*.)"

These five steps are known as the formal steps of instruction. These names are the ones used by American writers in place of the four used by Herbart, namely, Clearness, Association, System, Method. A modified form is commonly used in making plans for development lessons and examination answers, as follows:

I. Aim
II. Preparation
III. Presentation
IV. Application or drill

222. Justification of the formal steps. — Prior to Herbart's time (1776–1841), the old faculty theory of Aristotle was the prevailing psychology. That theory held that the soul was endowed with higher and lower faculties which were entirely distinct. The general divisions — knowledge, feeling, will — were subdivided into capacities or faculties, each subdivision having a distinct individual function. In place of this faculty theory, Herbart put the conception of unified mental life and development. He argued that the soul is a blank at birth, not endowed with intuitive faculties, but having capacity for adaptation to environment through sense-perception. Mental development is the result of these perceptions of presentations. The interaction of presentations passes through generalization to concepts, and then in turn to judgment and reasoning. In this development of a unified mind, the concept is the ideal; the process is apperception; and the result is a habit of thinking. Thus this formal method in a development lesson adjusts mind and matter for apperception and at the same time habituates the pupils to a desirable way of studying. Justification is claimed, therefore, since the process secures clear concepts, thorough apperception, and effectual habits of study.

223. Preparation. — This step is an effort to make the pupils' minds ready to apperceive the new knowledge. It does not mean the teacher's preparation or the pupils' prior study although both are necessary and useful. It uses acquired knowledge as an apperceiving group by which the new knowledge may be assimilated. So the purpose of this preparation is to put the body and the mind into a receptive attitude, and to relate the new and the old so that attention and interest will be active.

In brief, it is putting mental, moral, and physical powers into harmonious co-operation with the teacher's efforts.

How should such preparation be made? Agreeable opening exercises are the first contribution. In the recitation, it may be an anecdote, a description, a brief review of related work, or simply a statement of the aim of the lesson. During the day, brief physical exercises, the singing of a song, or even a two-minute visiting privilege may dispel fatigue and adjust the minds to the required condition. Tact is the best guide. The one danger is in making the preparation too long, — a scattering of attention and energy. Sometimes it is best to go straight to the presentation. In this, let the minds of your pupils be the criterion.

224. Presentation. — In this part of general method the teacher utilizes some of the specific methods discussed in the last chapter, as the inductive-deductive method. The minds prepared in the first step are now getting needed individual notions. Watch the process of passing to general notions.

225. Comparison or association. — The mind continues the process of apperception by associating, comparing, and contrasting the facts of the new lesson with the facts previously acquired. The mind here abstracts the essential characteristics of each notion presented.

226. Generalization. — Now the notions so clearly distinguished in the previous step are classified in the form of rules, principles, definitions, laws, maxims, or tables. The mind has formed general notions.

227. Application or drill. — We have seen that the purpose of instruction is the formation of general notions or ideas. But general ideas will not remain a possession without thorough drill. So this step requires

impressive drill and application to practical life. It is the completion of each educative act, namely, the return from general notions to particular notions.

Modification of Formal Steps

228. Aims. — In writing lesson plans, it is always advisable to state the aim of the lesson first, although this law of aim is not one of the Herbartian steps. A few years ago teachers in training were told not to express the aim of the lesson for fear pupils would lose interest in the development. It was supposed that the anticipation of results would guarantee co-operative interest and that thereby the pupils would discover the essential purpose of the lesson. That view is not sound today; it exalts the process of the presentation too much. Better state the aim as a focal point for all lines of energy during that recitation period.

229. Rein on aim. — Professor Rein, of the University of Jena, was a follower of Herbart, but the Herbartian doctrines were modified in many particulars by him. This opinion on the law of aim agrees with the current American view:

" The pupil should know beforehand what is coming, if he is to bring all his powers to bear upon the work of learning; and it is easier to call out all his effort if he knows beforehand what is to be gained. To conduct a child along an unknown road, toward an unknown object by means of questions and hints, the purpose of which he does not see, to lead him on imperceptibly to an unknown goal, has the disadvantage that it develops neither a spontaneous mental activity nor a clear insight into the subject. Having reached the end of such a line of thought the pupil looks about himself

bewildered. He stands at the goal, but does not see the relation that the result bears to the labor performed. He does not rise to that satisfactory mental activity and favorable disposition of mind which are stimulated by the pursuit of a clearly set purpose."

230. Dr. Hervey on formal steps of instruction. — Dr. W. L. Hervey, a member of the New York City Board of Examiners, gave his opinion of these formal steps in the New York Teachers' Monographs, December, 1900. The article is conservative and practical. He admits the validity of the opinion regarding general method and the movement of the mind, but he disapproves a rigid observance of the formal steps. He emphasizes the point that the five steps need not come in the order in which they are mentioned, but they all should come somewhere in every complete act of instruction. He cautions teachers against making the preparation too long because he has observed that pupils' minds have wonderful powers of adjustment to a straightforward and even blunt approach. He thinks that preparation instead of standing alone at the beginning of the recitation occurs at each step in teaching; each step should prepare for the next. Good teaching from start to finish is steeped in preparation. Preparation is no more an antecedent of the first step than it is of the third; hence preparation may involve the presentation, thought, or application or all of them; and second, that each of these involves preparation. There are an infinite number of preparations within each method-whole, and there should be infinite variety in the method of handling them. Nor is it necessary that comparison and generalization should hold rigidly to the order in which they are named, for

we frequently ask children to think and afterwards to imagine.

231. Dr. Hervey's conclusion. — "The human mind, (generally speaking) is not a blunderbuss. Yet from the direction for making lesson plans which I have known to be given to advanced classes by teachers of the formalist type, it would appear that teaching the mind is precisely analogous to loading a brass cannon. Swabbing, taking aim, loading with powder and shot, ramming home, setting off the fuse, all must come in a certain order not to be deviated from. Such a figure limps on both feet. In more senses than one it smacks of militarism. One who is appealed to by it belongs in a factory where things are made, or on the firing line where people are shot at, not in a school where minds grow and are fed.

"Therefore, the best way, in my judgment, to profit by the doctrine is not to think chiefly of steps, or of sequence, or of separateness, or of junctions at which one must change cars for the next step — the best teachers when at their best are, I trow, not thinking about the formal steps — but to think chiefly of the ideal end of instruction, as being that happy state of pupils' minds in which, for warmth and resource, there are abundant stores of concrete imagery, and, for economy and serviceableness, there is organization-pigeon-holes, and tags, card catalogues and indexes, or if you will, generals, lieutenants, and privates, each knowing his duty, and each on the qui vive to do it. The formal steps are, then, so many ideals which the teacher must attain before his work is done."

232. Colegrove on formal steps of instruction. — "These so-called 'formal steps' do not form a strait-

jacket to fetter the individuality of the teacher, as some critics seem to think; nor, on the other hand, are they a procrustean bed on which every recitation is to be stretched, for lessons consisting of arbitrary facts or unrelated ideas cannot be taught in this way. Like all general principles they admit of great variety in their application to details. They do not solve all the problems of method, but they do serve as a standard by which the teacher can measure the correctness of his daily practice, and, once mastered, they contribute very much to the teachers' skill, power, and success in instruction. It is a misnomer to speak of the 'five steps in the recitation,' for very often the whole recitation must consist of one or two steps only. Many consecutive lessons may consist of the fifth step alone." — *The Teacher and the School*, page 324.

Illustration of General Method

233. Illustrative lesson on attribute complement. — Attribute complement or attribute is known as predicate noun, predicate pronoun, and predicate adjective.

I. AIM. To teach attribute complement.

II. PREPARATION. Review definition of sentence, subject, predicate, noun, verb, pronoun, adjective.

III. PRESENTATION. Have these sentences on board:

1. Birds sing.
2. Happy children sing.
3. The children are happy.
4. Pupils become students.
5. Lincoln was a good man.
6. Longfellow was kind.
7. Longfellow was a poet.
8. It is he.

9. This is an attribute.
10. Who is it? It is I.

Sentences 1 and 2 will impress some of the points covered in the preparation. Sentence 2 is an easy approach to the adjective happy in 3.

All read the third sentence. Then individual answers on subject *children* and predicate *are happy*. Next get subject noun *children* and predicate verb *are*. Note that *are* alone is not the predicate; *are happy* is the predicate.

Teacher. Covering word happy, asks one to read.

Pupil. The children are.

Teacher. Is what you have read complete or incomplete?

Pupil. It is incomplete.

Teacher. Uncovers happy. Now is the expression complete or incomplete?

Pupil. The sentence is complete.

Teacher. What word makes it complete?

Pupil. Happy makes it complete.

Teacher. Happy is a complement. Write word on board; analyze it: *complete* + *ment; ment* = that which. Now define.

Pupil. Complement means that which completes.

Teacher. What part of the sentence is completed by happy?

Pupil. Happy completes the predicate.

Teacher. What part of speech is happy in sentence 2?

Pupil. Happy modifies the noun children; hence happy is an adjective.

Teacher. What part of speech is happy in sentence 3?

Pupil. The same; it is an adjective.

Teacher. Yes; an adjective completing the predicate.

It is a predicate adjective. Another name is sometimes given. If the children are happy, you can say that happiness is an attribute of the children. Thus for good children, goodness is an attribute; industrious pupils, industry is an attribute. So we may call happy a predicate adjective or an attribute complement.

Teacher. Find another adjective used as an attribute.

Pupil. Sentence 6, kind is an attribute.

Teacher. Then, as far as you have observed, what part of speech may be used as an attribute?

Pupil. An adjective may be used as an attribute.

Teacher. All read sentence 4. Then proceed as before to teach that students completes the predicate and refers to the subject. It is a noun used as attribute complement; or it is a predicate noun. Likewise for predicate pronouns, eliciting for each complement (*a*) that it completes the predicate, and (*b*) that it describes the subject or means the same as the subject.

IV. COMPARISON. Pupils distinguish attribute from object.

V. GENERALIZATION. Call for definition of attribute and, when suitable wording is secured, write definition on board. All read; individuals read. All define; individuals define.

VI. APPLICATION or drill. Direct application in such sentences as these.

1. This definition is easy.
2. Grammar is a useful subject.
3. Easy is a predicate adjective.
4. Emerson was a scholar.
5. The wind feels cool.
6. Who called? It was she.

Then apply by requiring contrast; thus:

1. This is our school.
2. We have a new school.
3. Whom did you ask?
4. Who was it?
5. This work seems pleasant.

For further drill, have pupils construct sentences containing attributes. It may be helpful to learn this list of verbs which are generally followed by an attribute complement.

be	seem
become	feel
appear	look

234. Method-whole. — The use of the general method requires a special classification of subject-matter. In order that we may apply the formal steps of instruction the subject-matter has to be grouped and classified into definite unities. Each unit of instruction is considered a method-whole. Thus in studying New York State all of the drainage could be put under an outline or classification; and then this general outline could be divided for particular lessons each week or each day. So it is that each division may be treated as a method-whole. Gordy defines method-whole as a group of particular facts involving a universal. In other words, any topic or portion of a subject that constitutes a unity such that the process of teaching follows the inductive-deductive method is a method-whole. It should be noted in connection with this explanation of method-whole that the matter of general method, formal steps of instruction, particular notion to general notion, inductive-deductive method, and complete act of

instruction are all different names for one general principle underlying the Herbartian general method. The lesson on the attribute complement is an illustration of a method-whole.

235. A definition of method-whole. — Each group of particular facts involving a universal is a method-whole. — Gordy, *A Broader Elementary Education*, page 197.

CHAPTER IX

SPELLING

236. Accuracy a worthy aim. — As long as accuracy remains a requisite of success in life, correct spelling should be considered a vital aim in education. A theoretical search for the causes of poor spelling may place the blame upon the pupil, the words studied, or the methods of teaching; but the practical accomplishment of spelling correctly will never come until teachers agree that spelling deserves to be taught as an individual subject and not merely as an incidental study. Errors are too often excused on the ground that it is impossible for certain pupils to learn to spell, or that misspelling is a mark of genius. Better strive for accuracy as an ideal than to justify errors by excuses.

237. Value of spelling. — It is not a culture study like history and literature, but it is a necessary art which is to be acquired in the most positive way and which is to become *automatic* as soon as possible.

It is no particular credit to be a good speller, but it is a disgrace to be a poor one. Spelling, therefore, has a conventional value which may not be despised with impunity. — Taylor, *Word Study in the Elementary School*, pages 27 and 28.

238. Psychology of Spelling. — It is a mistake to say that spelling depends upon the eye alone or upon any other single sense; spelling demands multiple sense

instruction. In learning to spell, as in all other educative efforts, the child should be taught to use as many senses as possible. One sense may do more than another, but one sense cannot accomplish the best results without the co-operation of the other healthy senses.

This opinion is upheld by Dr. Shaw in his little book on *Three Studies in Education.* After discussing experiments with more than two thousand children, he expresses this conclusion on page 10: " Spelling is largely a matter of association, and the eye, the ear, and the motor must be appealed to so as to produce the strongest complication of sensory elements. Care then in the right kind of oral preparation, with considerable oral test before writing, training pupils to build up words by using small unities into which words can be divided, is a method of teaching spelling productive of the best all-round results."

239. The problem. — Poor spellers are found in every class. This is a fact, not a supposition. Our duty is to find the causes of the trouble, and then try to apply specific remedies. Pedagogy is not a panacea, nor is wholesale criticism a helpful aid to efficiency. There are difficulties in subject-matter, in pupils, and in teachers.

Difficulties in Subject-Matter

240. Composite language. — The English language is a composite one, derived from a large number of other languages, and so there are many irregularities. For illustration, note the origin: depot, French; coffee, Arabic; banana, Spanish; waltz, German; sloop, Dutch; drink, Anglo-Saxon; gale, Scandinavian; manual, Latin; epistle, Greek. The principal difficulties are the following:

1. Silent letters.

2. Language not phonetic, *i.e.*, spelling different from sound; as, eight, phonic, praise.

3. Different pronunciations for same combinations of letters; as, *ou* in ought, soul, bough, etc.

4. The numerous sounds of the vowels. One educator puts ninety-five per cent of all errors in spelling under this head.

Difficulties in Pupils

241. Not knowing how to study. — In every lesson there are certain words which the pupils already know. In spelling, as in all other subjects, the process should be one of separating the known from the unknown so that the child may direct his energy toward what he does not already know. Habituate pupils to this process of selection so that they may devote their energy to the mastery of the new words in the list. Notice, too, the specific difficulty in each word. Can the word be spelled phonetically? If not, why? The answer will direct attention to the difficulty. Homonyms illustrate this difficulty. Where is the accent? Pupils rarely misspell any accented syllables because the emphasis has impressed those syllables upon sight and hearing. Hence, observe the unaccented syllables for visualization.

242. Failure in observation. — Take the pupil apart from the class for personal instruction. Test him on a few words to find his difficulty, and it is probable that the difficulty is in not seeing the word exactly as it is. Take two or three words apart from the printed or written exercise and encourage him by having him master these few words by oral and written effort, and then give

him credit for every indication of progress. This is a special effort in the formation of right habits of study, and every progress made by a defective pupil will be an encouragement that will work its own reward. A persistence in right habits will overcome the defect in failing to see the word exactly as it is printed or written.

243. Carelessness. — Try visualization. Write five words on the board. Have pupils look intently at them, then cover or erase the words and let pupils try to write the list in order. A few exercises of this kind will direct attention to the difficulties in each word, the order of the words and their particular relation to one another. An entire lesson can be learned by a whole class in a short time in this way. It is another means of promoting the social stimulus advocated by Dewey.

Difficulties in Teachers

244. Defective teaching. — The third cause for poor spelling can be found in the teachers themselves. Instead of making an adverse criticism in general, let us consider ten specific ways in which a teacher may fail to make a pupil get a complete, accurate grasp of the words in spelling.

245. Using eye alone. — This plan has produced some excellent results, especially under the process called visualization. Pupils have acquired habits of silence, intensive application, interest, obedience, and mastery. Such pupils are called eye-minded, a rather vague classification for children who are endowed with capacity for intelligent observation. When failures have to be explained, we are told that some pupils are ear-minded. This is another instance of juggling with terms, a practice that has associated pedagogy with

nonsense. An elementary knowledge of mind is enough to make us understand that the mind of any normal child retains and reproduces an idea more easily if the impression of that idea has been enforced by as many senses as possible. For this reason, the good teachers encourage the use of eye, ear, tongue, and hand. The child is denied none of his natural rights, and, in most cases, the results are satisfactory because the using of all of those powers together produces an effect much stronger than the total effect of appealing to those powers one by one.

246. Rote work. — The memory is overtaxed by learning lists of unrelated words. The remedy is in turning to words used in conversation or in the daily lessons.

247. Neglect of spelling as a subject. — Spelling can never be satisfactorily taught as an occasional exercise in connection with other subjects. It can be correlated in this way, of course, but it deserves a place as an individual subject in the regular program.

248. Abuse of dictation. — It is an abuse of dictation to use it for purposes of drill or review before pupils have mastered the spelling of new words. The term dictation as used here has reference to the teacher's reading of certain sentences to be written by the pupils for the purpose of testing the pupils' knowledge of the spelling and the use of the words in the assigned lesson. Premature use of dictation leads to confusion instead of clearness. The evident remedy is to make effectual study of the lesson prepare for effectual application. Then the habit of learning spelling will require dictation as a process supplementary to the intensive study of the words, — a process that will prove to be effectual

because it brings into use all of the available powers of the child.

249. Indistinct concepts. — The meanings of words are given as dictionary definitions. Encourage pupils to give their own expressions and applications. This is a suggestion for the use, not the abuse, of the dictionary.

250. Lapses. — Infrequent recitation periods and lack of varied and thorough drill. This failure to give adequate drill is one of the serious defects in modern education. Is not repetition a fundamental law of habit?

251. Unscientific classification. — Classification of words according to the number of syllables. This is unscientific and uninteresting. Use grouping under comparison and contrast.

252. Interruption. — Trying to teach spelling when the child's mind is unprepared. Do not interrupt connected thinking in other subjects to correct a misspelled word. Keep the word for a special list.

253. Lack of variety. — Failure to use a variety of interesting drills involving competition such as spelling down or choosing sides. See section 33. Remember the necessity of satisfying instincts or impulses if we wish to secure reactions.

254. Excuses for failure. — Permitting pupils to form the habit of thinking that correct spelling is impossible. The will is weakened every time we permit pupils to substitute excuses for effort.

255. What words shall pupils spell? — Some favor a list of words selected from the pupils' vocabulary and from the lessons of the grade, while others advocate the use of a spelling book. In either case, the present

tendency of opinion seems to be this: *It is sufficient for a child to be able to spell the words he can use.* This view is in accordance with the principles of adaptation, utility, and interest.

Arguments for Text-Book

256. Convenience. — Time saved for pupil and teacher.

257. System. — Modern books are not miscellaneous lists of words; grouping and scope are determined by the needs of pupils.

258. Breadth and utility. — Adequate provision is made for future demands as well as for actual present use.

259. Accuracy. — Spelling, syllabication, accent, and even pronunciation are accurately given. Errors are frequently made in copying lists.

260. Stimulus. — Ownership is an instinct, and happy is the child who is made to feel the worth of such an incentive. The average pupil can go far beyond the limited list of words in his grade, and a simple appeal to personal ambition will encourage him to do so. The book is an invitation to self-activity; it is a means to helpful rivalry; and it offers individual guidance to the future of the child who must leave school to earn a living.

Arguments for Lists of Selected Words

261. Specific utility. — The words become a part of definite knowledge through the child's thinking, feeling, and acting. Opposed to vague concepts because the child knows and uses every word; development through activity and apperception.

262. Interest. — The child's interest is limited to the present; hence, limit words to present use.

263. Adaptation. — Books adapted to average groups may not satisfy individual needs.

264. Economy of effort. — Lists are conducive to concentrated, productive effort; books present many words that are useless on account of being too easy or too difficult.

265. Correlation. — Lists selected from all the subjects in the grades tend to produce unity and accuracy in each child's circle of thought.

266. Summary of arguments.

Text-Book	*List of Words*
General utility	Specific utility
Economy of time	Economy of effort
Provision for future	Satisfaction of present needs
Accuracy of spelling	Clearness of concepts
Adaptation to average pupils	Adaptation to individual pupils
Breadth through individual effort	Concentration upon essentials

267. Combination of book and lists. — Use the best text-books available, and then meet the deficiencies of the text-book by a list of selected words applicable to the individual needs of the class. Combine all useful devices.

268. Three ways of conducting recitations. — Oral, spelling, written spelling, and a combination of oral and written spelling are usually classified as three methods. Numerous devices are often discussed as methods. The three methods mentioned should be combined or alternated frequently so that pupils may profit by all of the advantages in each method.

269. Advantages of oral spelling.

1. It teaches enunciation, syllabication, pronunciation.

2. Interest stimulated through honest rivalry.

3. Economy of time by avoiding the necessity of correcting papers.

270. Disadvantages of oral spelling.

1. It does not insure correct written spelling.

2. Every pupil does not have to spell all the words of the lesson.

3. Inattention may be fostered in a large class.

271. Advantages of written spelling.

1. Practical because it prepares for accurate written work.

2. Every pupil has to spell all the words.

3. Co-ordination of many senses.

4. Correlation of many subjects.

272. Disadvantages of written spelling.

1. The pupil must use his sense of hearing to obtain proper enunciation and pronunciation.

2. Social stimulus is lacking until the report of the exercises is made.

3. Dishonest work by copying and also in correcting the work when papers are interchanged.

Directions for Studying Spelling Lessons

273. Physical conditions. — See that the environment is satisfactory: light, heat, ventilation, seats, books, and other material.

274. Responsibility a stimulus. — Prepare the minds by telling the children that the purpose of this exercise is to master a definite amount of work in a specified time. This kind of approach is a compliment to the

intelligence of the children. There is no harm in using the word work since the average healthy child welcomes any assignment that carries the possibility of quick mastery. There is a stimulus in the certainty of success. The acceptance of responsibility under hope of success is the first victory for the child as the teacher tries to help him acquire the habit of vigorous and persistent work.

275. Concentration. — Have pupils look carefully at the word. See sections 241 to 243 inclusive.

276. Reproduction. — Close book, think of the word, write it. Do not permit pupils to try this frequently for the purpose of testing themselves. Teach them the value of intensive study mentioned in the preceding section; then the supplementary use of this reproduction will be evident. Observe how this reproduction utilizes co-ordination of powers.

277. Comparison. — Compare the written word with the printed word. This is called verification, checking, or proving. It is habituation in self-correction, an educative effort which Spencer calls empirical.

278. Repetition. — Repeat the process when mistakes have been made. But here is a place to distinguish useless repetition and legitimate repetition required in fixing habits. While perfection is not expected, every pupil should be made to feel the serious waste in repeating processes that were first passed over in a thoughtless way. The habit of consciously using one's powers effectually is the paramount value here as elsewhere.

279. Rowe quoted. — In support of these suggestions, a quotation from Rowe's new book is inserted: "Four habits have usually been formed by the pupil before he spells accurately: (1) the habit of critically observing

the spelling of new words as he comes upon them in reading; (2) the allied habit of noticing where words differ slightly from his image or expectation of them; (3) the habit of hesitating to write a word whenever its spelling may be in doubt; and (4) the habit of taking a final glance at the word just written to see that it conforms to the intention of the writer and seems correct. — *Habit-Formation*, page 112.

280. Difficulties. — Meaning of words, use of dictionary, and other pertinent topics relating to the study of a spelling lesson are discussed in other parts of this chapter.

281. The old way. — When spelling held equal rank with arithmetic and other studies, it was customary for the teacher to assign an exercise for study in school or at home, and then the pupils considered it a part of their duty to learn to spell every word in the exercise. This plan of assignment and study is criticised in the new education on the ground that the learning of such words in that manner is a mere exercise of the memory without the use of correlation or multiple sense in the process of learning. What, then, shall be substituted? Let us interpret some investigations.

Experiments in Studying Spelling

282. In Germany. — A German educator, Herman Schiller, has made a practical investigation of oral and visual modes of learning spelling. His conclusions are quoted in Principal W. B. Wait's Annual Report for the New York Institution for the Blind, 1903. They are in the order of merit, from highest to lowest. The quotation marks indicate Mr. Wait's report; the comments are ours.

1. "Copying with speaking (naming the letters softly)." This plan employs the eye, the ear, the tongue, and the hand; it requires attention, observation, and physical poise; it presupposes good control of the class and favorable environment.

2. "Copying with speaking aloud." This plan is criticised because the noise made by a large number of the pupils may be a source of disturbance to several pupils in the class.

3. "Seeing with writing movements." Under this plan a word is written on the blackboard or on a card so that every pupil in the class can see it. Pupils visualize the word. In making the writing movements in the air, their effort to learn combines the sense of sight and the motor activity.

4. "Spelling (hearing the letters named)." This plan is criticised because it deals with letters as the units of our language instead of considering words as symbols of ideas.

5. "Seeing with speaking aloud."

6. "Seeing with speaking softly."

7. "Seeing alone."

8. "Hearing with writing movements."

9. "Hearing and speaking aloud."

10. "Hearing with speaking softly."

11. "Hearing alone (word pronounced only)."

"In all these methods, except hearing the letters named, and hearing the word pronounced, but not spelled, the work is done by the pupil alone. Spelling based upon words pronounced but not spelled to the pupil takes the lowest place, but spelling based on words both pronounced and spelled to the ear takes fourth place. Here it should be noticed that there is a long

period in the child's life before it has learned to read or write, when hearing and speech are the only available means of learning language."

"It will be seen that Schiller gives first place to a composite method, copying and speaking softly; the complete act involving the four memories, namely, a visual form of memory, a manual motor memory, vocal motor memory, and the aural memory."

283. Suggestions to the teacher.

1. Pronounce the word only once.
2. Give only one trial in oral spelling.
3. Work for natural tones in spelling.
4. Do not mispronounce unusual words for the sake of aiding the child in spelling such words.
5. Vary the order from that given in the spelling book.
6. Have pupils pronounce the word before and after spelling it.
7. Have children pause at the end of each syllable, but do not have them pronounce each syllable separately.
8. Teach phonic spelling whenever that will be an aid in mastering the words.

284. Rules for spelling. — A few simple rules may be helpful to pupils who find difficulty in ordinary spelling, but such memorizing should be limited to actual usefulness. The limitations are evident as soon as a child finds more difficulty in learning and applying the rules than in memorizing the words themselves.

The substance of the rules is the same in all texts, but simplicity and clearness in wording is found in the following from Reed and Kellogg's *Higher Lessons in English*, page 258.

Rule I. — Final e is dropped before a suffix beginning with a vowel; as, fine, finer, love, loving.

Exceptions. — The e is retained (1) after c and g when the suffix begins with a or o; as, peaceable, changeable; (2) after o; as, hoeing; and (3) when it is needed to preserve the identity of the word; as, singeing, dyeing.

Rule II. — Y after a consonant becomes i before a suffix not beginning with i; as, witty, wittier, dry, drier.

Exceptions. — Y does not change before 's, nor in forming the plural of proper nouns; as, lady's, the Marys, the Henrys.

Rule III. — In monosyllables and words accented on the last syllable, a final consonant after a single vowel doubles before a suffix beginning with a vowel; as, hot, hotter; begin, beginning.

Exception. — X, k, and v are never doubled, and gas has gases in the plural.

285. Classification of words.

1. Primitive. A word in its simplest form is a primitive or prime word; as, by, in, man, short, go.

2. Derivative. A word formed from a primitive word by joining prefixes or suffixes is a derivative word; as, going, unmanly, recall.

3. Compound. Two or more words united into one word form a compound word; as, today, watchman, subject-matter, text-book.

4. Synonyms. Words having the same or similar meaning are synonyms; as, hope and expect; certain and sure; devout and pious.

5. Antonyms. Words having opposite meaning are antonyms; as, good and evil; lazy and industrious.

6. Homophones. Words having the same sound but different spelling and meaning are homophones; as, sell and cell; beer and bier; write, rite, and right. Sometimes called paronyms or homonyms.

7. Homonyms. Words having the same sound and spelling but different meaning are homonyms; as the verb bear and the noun bear; the verb receipt and the noun receipt. Sometimes called homographs.

286. How to teach synonyms. — The first attention to synonyms will be directed by the teacher. During the class criticism of compositions, favorable occasions will arise. The teacher's explanation must be the source of information until pupils are able to understand the dictionary distinctions. Pupils enjoy the liberty of expression that seems to be granted by the choice of words. Following are suggestions:

1. Let oral and written language show the need of synonyms.

2. The early use of synonyms is larger power of expression; a later use is precision in language.

3. Observe the choice of words in quotations, dictation, and other literary material. This is using a model.

4. Have pupils use their own language in making distinctions; verify answers by dictionary or other authority; use the synonyms in sentences.

Illustrations

1. Ability, capacity. Ability is active power; capacity is receptive power. You have shown ability in algebra and capacity in literature.

2. Between, among. Between is a preposition showing relation of two things; among, more than two. Rachel stood between first and third among forty pupils.

3. Character, reputation. Character is what you are; reputation is what people think you are. "Character is injured by temptations and by wrongdoing; reputation by slanders and libels."

4. Compare, contrast. Compare is to find resemblances; contrast, to find differences. Compare Labrador and England in latitude and contrast them in climate.

Habit, custom, usage. Habit relates to acts of an individual; custom implies the consent of many; usage is established custom. If you wish to conform to the usage of literary men, observe the custom of our best writers and then try to form habits accordingly.

A Lesson on Synonyms

AIM. To teach the synonyms habit, custom, usage.

PREPARATION. The teacher has directed the attention of the pupils to synonyms in the correction of compositions. Models in literature have been studied for the purpose of observing choice and distinction of words. Synonyms in reading lessons have been explained and discussed. Now the pupils are prepared to note the differences in meaning in these synonyms: habit, custom, usage.

Three sets of sentences are written on the board:

Set I

1. John has the habit of arising at six every morning.
2. Mary's habit is to practice every afternoon.
3. Rover has the habit of watching for his young master every afternoon.
4. Lincoln formed the habit of collecting and telling amusing stories.

Set II

1. It is the custom of factories to close at five o'clock.
2. The custom of our school is to have assembly every morning.

3. It is the custom of the boys to subscribe to *Current Events* every term.

4. The Chinese customs do not differ from those of their ancestors.

5. It is the custom of the American people to honor the anniversary of Lincoln's birthday.

Set III

1. Usage demands that February 12th be celebrated with appropriate public exercises.

2. The usage of the best writers calls for simple, direct English.

3. The usage of the Chinese has prevented the introduction of western ideas.

4. Usage demands that men remove their hats on entering church.

PRESENTATION. The sentences containing the word habit are read by several pupils. Then the teacher conducts the lesson by questioning. Brief answers are suggested here, but answers in complete statements may be required in the lesson with the class.

Teacher. How many people are spoken of in the first sentence?

Pupil. One.

Teacher. What habit has he?

Pupil. The habit of arising at six.

Teacher. How often has he arisen at six?

Pupil. Every morning.

Teacher. Does this action require effort and thinking?

Pupil. No.

Teacher. Why?

Pupil. He has done it so often it is easy now.

Teacher. What have we called Mary's act of practicing, in sentence two?

Pupil. A habit.

Teacher. In each sentence we have spoken of how many people?

Pupil. One.

Teacher. What have we called the action of each?

Pupil. A habit.

Teacher. Habit is used, then, in relation to how many people?

Pupil. One.

Many pupils are called upon to state: Habit is used in relation to the acts of one person.

Set II. On Custom

Teacher. Does the fifth sentence refer to one or more than one?

Pupil. To more than one.

Teacher. What does that sentence say the people do?

Pupil. Honor the anniversary of Lincoln's birthday.

Teacher. What is the action called?

Pupil. A custom.

Teacher. Why did the United States form the custom of honoring Lincoln's birthday?

Pupil. Because the people loved him and wished to show their gratitude to him.

Teacher. They all agreed, then, to the act of honoring his birthday. That agreement of many people made the honoring of Lincoln a custom.

Similar procedure with the other sentences in Set II.

Teacher. Look at the sentences in Set II again. Do you think a few people can make a custom?

Pupil. No; custom requires the agreement of a large number of people.

Teacher. Custom implies the consent of many, as you have said. This conclusion is expressed by several pupils.

Set III. On Usage

Teacher. What demands that February 12th be celebrated with appropriate public exercises?

Pupil. Usage.

Similar procedure with other sentences in Set III.

Teacher. How was Lincoln regarded by his country?

Pupil. He was regarded as a hero whom all loved.

Teacher. According to the first sentence, how may we honor our heroes?

Pupil. By celebrating their birthdays.

Teacher. How long has this custom been observed?

Pupil. A very long time. The people of the olden times did likewise.

Teacher. A custom that has lived very long becomes usage. It is accepted and followed by the best thinkers.

Teacher. What does usage or long established custom ask of good writers of English?

Pupil. Simple, direct language.

COMPARISON. One sentence in each group is considered. All three are compared and the differences in meaning brought out. Children state in their own words the distinction. Pupils are sent to dictionaries to verify the distinction in use.

APPLICATION. The teacher requires the children to give sentences employing the synonyms.

Sentences with blanks are written on the boards. The pupils fill in the blanks with the proper synonyms, always stating why they have used the synonyms chosen.

Teacher encourages the use of the synonyms learned in oral and written work.

287. How to teach homophones. — As these words are alike in sound, the sense of hearing alone will lead to error. Observe the difference in spelling and the difference in meaning. With younger pupils, the words should be mastered one at a time; with older pupils, the whole group furnishes a basis for contrast and a stimulus for mastery. A few groups will suffice. It is understood, of course, that use in good sentences is one final test of a knowledge of the spelling and the meaning of homophones. *The Rational Spelling Book*, by Dr. J. M. Rice, calls such words as these homonyms:

bad, wicked
bade, did bid

dying, expiring
dyeing, coloring

rain, water from clouds
reign, to rule
rein, part of harness

rite, a ceremony
right, correct
write, to record letters
wright, a workman.

air, atmosphere
ere, before
e'er, ever
heir, one who inherits
Ayr, a town in Scotland

288. How to teach homonyms. — Since homonyms differ in meaning only, this one difference is the point to attack in teaching and learning. Recall all that has been approved as efficient teaching of spelling and apply as much of it as possible in teaching homonyms. Here are a few specific directions:

1. Teach only such homonyms as young children need to know.

2. Teach one homonym at a time.

3. Teach by conversation and explanation; have pupils converse, explain, and use the word; write sentences.

4. Teach the corresponding homonym in a similar manner.

5. Use both in sentences; drill on meaning and spelling; pupils construct sentences.

6. Illustrations of homonyms.

bear, an animal
bear, to carry

cheer, good feeling
cheer, to encourage

saw, a carpenter's tool
saw, did see

How to Teach the Meaning of Words

289. Associative or objective process. — The object is shown and the name applied. If object cannot be used, show picture or other representation such as a drawing. Moulding board is a familiar means. Thus in teaching the noun **divide**, a word used for watershed in geography. Observe a divide in the school yard after a rain; compare roof; make an excursion to a hill and see that it is a divide; use pictures, drawings, and sand table.

290. By imitation. — Buzzing, flying, swimming, rowing, and similar words are represented by action; likewise for words like mew, bark, purr, neigh, and bleat. This activity appeals to the dramatic instinct in children. Compare kindergarten activity.

291. By the context. — Most words being understood, focus attention upon what is not understood and then try to supply or substitute the meaning needed

to complete the thought in the sentence. Take a quotation from Hawthorne: "Happiness in this world, when it comes, comes *incidentally*. Make it an *object* of pursuit, and it leads us a wild-goose chase, and is never attained." The italicized words can be defined from the context.

292. By etymology. — Take autograph: *graph*, write; *auto*, self; a signature written by the person himself. Compare telegraphy, phonograph, geography, stenography.

Consult Anderson's "A Study of English Words," American Book Company, 1897; Trench's "On the Study of Words"; Greenough and Kittredge's "Words and their Ways in English Speech," Macmillan, 1901; Kennedy's "What Words Say."

In analysis and synthesis pupils should use the technical names of parts of words. Root, stem, base, adjunct, prefix, and suffix are used by different authors, but base, prefix, and suffix are enough.

The primitive form of a word is the root. It is the name used by philologists to denote the original form and meaning of the word.

That part of a word to which the inflectional endings are added is the stem. The stem may be the same as the root, or it may be a modified form of the root. Thus in abduct, *duc* is the root; *duct* is the stem.

The word or stem to which other parts are joined is the base. The base may be a word, as in *man* + hood; or it may be a stem, as in auto + *graph*.

A form or word joined to the base is an adjunct; as, rest + *ful*, *steam* + boat.

A form placed before the base is a prefix; after the base a suffix.

ILLUSTRATIONS

PREFIX	BASE	SUFFIX	DERIVATIVES	MEANING
ad, to	join, add		adjoin	to join to
bene, well or good	factor, doer		benefactor	one who does good
contra, against	dict, speak		contradict	to speak against
super, above	script, written	ion, that which	super-scription	that which is written above
ob, against	vi, way	ous, being	obvious	being directly in the way, against or in front of us
ad, to	ject, thrown	ive, inclined to	adjective	inclined to be thrown to another word

293. By the history of words. — This is another kind of etymology. Thus dahlia is derived from the name of the botanist Dahl. Dunce is from Duns Scotus, a famous scholar, whose theories were later ridiculed so much that his name became a synonym for stupidity. Trivial is from *tres viae*, the junction of three roads in Rome where gossipers spent their time in idle talk. Sincere is *sine*, without, and *cera*, wax; a guaranty applied to perfect vases sold in Italy.

294. By finding synonyms. — Comparison and contrast impresses the meaning and at the same time enlarges the vocabulary. For example, take excite and incite. Excite, to rouse feelings for action; incite, to urge the excited feelings to accomplish something. A teacher excites her pupils for the consideration of social duty and then incites them to do their duty.

295. How pupils may show their knowledge of the meaning of words.

1. By the use of the words in conversation.
2. By interpretation of the words in reading.
3. By constructing illustrative sentences. Inflammable means burning with a flame, while combustible means burning without a flame.
4. By forming definitions.
5. By using synonyms.
6. By giving etymology.
7. By drawings and models.

296. Means of learning pronunciation.

1. By imitation of teacher.
2. By phonic drill.
3. By practice under 295.

297. Uses of the dictionary. — The dictionary is intended as a means of verification and also as a source of general information. Facility of use of the dictionary implies the following:

1. How to find the word.
2. How to understand the sounds of the letters as indicated by the diacritical marks.
3. Mastery of syllabication.
4. Observation of accent.
5. Pronunciation.
6. In the higher grades, discrimination in the use of words, etymology, etc.

298. Devices in word-building. — This synthetic drill supplements the exercises in analysis of words, and also serves as generalization and application of all phases of knowledge in spelling.

1. Write on the board a dozen prefixes with meanings, root-words, and suffixes. Help the pupils memorize

these three lists, and encourage pupils to add other prefixes, roots, and suffixes. Copy lists in books for permanent use at home or in school. This material can be used in a lively competition to form the largest number of words. Pupils should consult dictionary to prove the accuracy of their own work. For helpful reference books, see section 292.

2. Each pupil gives a word having the suffix *er*, and then defines the word.

3. One pupil gives a word and another pupil names synonym or homonym.

4. Teacher suggests a word like graphic; pupils give other words having the same root.

5. Suggest phonogram such as ail; conduct phonic drill on b, f, h, j, m, n, p, qu, r, s, t, w; combine; spell phonetically; use in sentences. Proceed in a similar manner with other phonograms like ate, at, et, air, ow. All the letters of the alphabet will thus receive phonic drill.

6. Form words from letters. Grant right to use the whole alphabet, but put a time limit upon the work. This exercise is a test in the constructive ability of the pupil. It is the synthetic process of testing analysis. Every effort to form a word from the given letters makes an exercise in recalling the roots, the prefixes, and the suffixes in familiar words. At the same time it may be a review of phonics as employed in homonyms and antonyms.

299. Grouping words by comparison. — We have already said that grouping words according to the number of syllables is unscientific. Some authors group according to meaning; others according to subjects or occupations. Comparison in spelling looks for similarities.

out	ought	rough
hour	thought	enough
drought	sought	tough
pout	bought	slough
stout	brought	southern
dough	through	should
soul	wound	would
source	tour	could
shoulder	you	
although		

300. Grouping by contrast.

hour	bow	nought	too
power	sew	naught	through
rough		wood	dough
ruff		should	low

301. Correlation through dictation. — The dictation exercises made by the teacher or the pupils will use the related parts of the grade work. If the pupils are following a selected list of words instead of a spelling book, it is likely that every word is studied in its related sense rather than as an isolated word. The summarizing value of adapted dictation exercises includes the correct use of the assigned words, the words misspelled from time to time, the words considered essential in the assignment of other lessons, and, in general, whatever words are needed in making the transition to a new grade by promotion. If this summary seems too comprehensive, it is justified by the requirements of the pupils' daily experience. The habit of accuracy in written work and the breadth of content secured by correlation make dictation exercises a direct preparation for life.

302. "Make every lesson a spelling lesson." — Not approved pedagogy. The custom of directing attention to misspelled words in every recitation is likely to distract the pupils by taking their attention from connected thinking in some other line of work. Such distraction cannot be justified for the sake of correcting misspelled words. As already suggested, there should be a special spelling list in every class. It is better for the teacher to make note of any errors in the other lessons and then reserve those misspelled words for the regular exercise during the spelling period.

303. Pronunciation of each syllable. — This practice is not generally approved. It is better to indicate a syllable by a pause, since the pronunciation of each syllable tends to separate the word into too many elements and thus to destroy its function as a symbol of one idea.

304. Repetition in writing misspelled words. — Do you approve writing misspelled words fifty times or more? No, not even ten times. Such an exercise is harmful as a means of correction. After a number of repetitions, the writing becomes a formal exercise without thought.

Variety in the Recitations

305. Combination plan. — Teacher pronounces words, pupils write on paper; teacher spells words, each pupil marks his own paper and rewrites misspelled words. Oral spelling of all the misspelled words. This plan maintains order, institutes the habit of systematic procedure and requires the use of self-activity and individual responsibility. It is a preparation for future pupil government in the spelling period.

306. Self-correction. — Teacher pronounces words,

pupils write; self-correction, pupils consulting books; papers submitted to teacher. This plan is an effort toward self-correction and a test of observation, industry, and honesty. The pupil does the work.

307. Interchange. — Teacher pronounces words, pupils write; papers exchanged, marked, and returned; critics consult each other if necessary and refer to books to settle disputes. Such mutual criticism exalts the function of criticism, habituates the critic in accuracy, has justification by authority, and gives the consciousness of social responsibility. Each pupil begins to feel his twofold duty to the class and to himself.

308. Monitor. — Teacher pronounces words, pupils write; one pupil stands, faces class, pronounces and spells while the others mark their own papers. Replace the spelling monitor if he misspells a word. This device tests enunciation, syllabication, and pronunciation; stimulates the desire of recognized leadership; promotes an active class spirit, and sustains a healthy interest in the work of the recitation period.

309. Group criticism. — Divide the class into two groups; all pass to the board; one group writes, the other group criticises; teacher or pupil pronounces words. Alternate the groups. In this way the teacher sees all the work and readily estimates its accuracy while the pupils are actually doing the work.

310. Individual responsibility. — One group at board, one group writing at desks. Teacher pronounces words, notices errors at the board, and pronounces a second time the misspelled words. Pupils at seats aid as critics. This exercise is an economy of time for teacher and pupil as it serves to approximate the work of a regular examination.

311. Class responsibility. — Appoint a committee of five pupils to prepare words for one week. Let this committee put words on board, conduct spelling recitation, mark papers, tabulate reports, and suggest remedies for faults. This plan has so many merits that none but a weak teacher will reject it.

312. Alertness. — All stand, spell in order, teacher not mentioning the misspelled words. The pupil who detects and corrects a misspelled word passes to a place of honor. This utilizes the competitive instinct in children and promotes the habit of thoughtful alertness.

313. Choosing sides. — Group instinct, loyalty, determination to win.

314. Spelling down. — Individual satisfaction in victory after honest rivalry.

Co-operation through Responsibility

315. Pupils as examiners. — Ask the pupils to prepare twenty-five words for spelling examination. Suggest that this work be done at home so that the individual element may be sure to be felt.

316. Pupils as reviewers. — Invite pupils to make dictation exercises covering the work of a week or a month. Insist upon the standard of accuracy in spelling, capitalization, and the proper use of the words. Invite the use of sentences taken from literature or some other subject in the grade rather than the construction of sentences dealing with meaningless thoughts of the child.

317. Pupils as critics. — Assign one pupil as leader with the privilege of choosing four others to serve with him as critics in marking the class exercises for a certain day. Have the work done at home and have each critic

sign his name to the paper marked by him. Return papers the following morning and distribute them to their owners. Give each pupil the right of appeal to his critic and finally to the teacher. This exercise emphasizes the responsibility of the critic while it teaches the child the real meaning of criticism as distinguished from fault-finding.

318. Pupils as friends. — Suggest the desirability of trying to attain the teacher's ideal of neatness and accuracy. This appeal from a true teacher will secure the desired response.

CHAPTER X

COMPOSITION

319. Utility and culture. — To him who looks for the practical value of education, oral and written composition has recognized usefulness as a means of business intercourse. No argument is needed to justify the prominence given to composition in the course of study; the only appeal is for some kind of teaching that shall assure rapidity and accuracy in the approved forms of commercial expression.

There is another value in composition, aside from that which helps to earn a living. It is the culture value. Literature is composition; and out of the treasures of literature many a mind has drawn a compensation that is not measured by dollars and cents. It is a compensation that serves as a satisfactory substitute for much that is lacking in life. This joy of literary appreciation is a direct stimulus to imitative construction in composition. Here is one reason why pupils are required to study literary masterpieces as models. In studying a type of composition, the pupils are getting proper habits of interpretation and appreciation; the appreciation arouses a desire to imitate; and the desire to imitate is carried into execution through the voluntary act of the will. Thus we have an educational process in which the fruitage of culture is both a cause and an effect.

320. General aims.

1. To educate by stimulating thought.

2. To develop the habit of fluent, easy, and correct expression.

3. To help impression through expression.

321. The pupils' motives: pleasure, spontaneity, interest. — To relieve the writing of compositions from all feelings of drudgery, teachers are urged to make the desire of giving pleasure the predominating motive of the child. As soon as a pupil aims to write something that will please his teacher or his classmates, or any other friends, his production will be characterized by spontaneity; in reading it or having it read, his interest will be sustained or increased; and after receiving favorable criticisms, which should always be given, he has a powerful stimulus for more and better work in this line. Note that the intellect, the feelings, and the will are all strengthened as the pupil habituates himself to writing under these conditions.

322. Principles determining selection of matter for compositions.

1. Within scope of child's knowledge.
2. Within scope of child's interest.
3. Limited to prevent wandering.

If we assume that grading satisfies the welfare of the pupils, we may conclude that these principles apply whenever a theme for composition is selected within the prescribed limits of the grade work. In the fourth grade, for instance, is the theme Columbus a satisfactory theme? Under principle one, it should be satisfactory; under principle two, it is satisfactory; but under the third principle, it must be rejected. But limit the thought to The Boyhood of Columbus, and we have a theme that satisfies the three principles. Test in the same way for the seventh grade. The theme Columbus

presents even more danger of scattering thoughts; but choose The Discovery of Land for a descriptive composition, and there will be no need of depending upon text-book theory for the valid application of the three principles mentioned.

As another illustration, take The Panama Canal. Is it, as a subject, topic, or theme for elementary grades, justifiable? It is or can be within the realm of interest of every child above the third grade, but has the average pupil enough definite knowledge for serviceable exposition? Probably not; and, for this reason, the third principle is not satisfied. But it is possible to limit the scope of this subject, get the desired information, and then write a composition in accordance with the principles stated, or any other principles accepted for the guidance of the work in composition.

The experienced teacher passes quickly from abstract principles to test the results of classroom work. Theoretical tests must yield to practical tests. The good teacher makes the subject conform to accepted principles because she knows the interrelation of knowledge and interest. Having these two, she makes the writing of the composition a pleasurable reaction. Thus the three principles are exemplified in one teaching act.

323. Suggestions for the teacher. — Much help can be found in Carpenter, Baker, and Scott's *The Teaching of English.* See page 134, in support of these suggestions on the preparation of the teacher:

1. Choose a subject that has possibilities; keep in mind the principles given in section 337.

2. Present it in such a way as to make the pupils see its possibilities.

3. Stimulate oral discussion, but so direct it as to prevent wandering.

324. Kinds of composition exercises. — The two general divisions of composition work are oral and written. Under each of these there are various subordinate kinds which will be discussed in this chapter. One mistake in teaching is to separate oral and written exercises. Each aids the other and both should be used in every development exercise.

325. Oral composition. — This form of composition naturally precedes written composition, but pupils do not realize that talking is composing. While oral composition is a specific kind in itself, it should always be used as a preliminary preparation for every written composition. It makes the transition easier because the pupil feels that the writing is only another way of expressing what has already been expressed orally.

326. In primary grades. — In the lower primary grades, the oral work may be divided into conversation and reproduction, the aim of the latter being to have the child give the exact words as nearly as he can. Simple and interesting conversation topics may include nature study, pictures, experiences of childhood, facts impressing kindness, good conduct, cleanliness, and courtesy; and a little later the use of myths, fables, and historical narratives may be introduced.

327. Dr. Maxwell on oral composition. — The phases of oral composition are here presented in seven headings, as originally printed in *School Work*, Volume I, page 1. In regard to the use of sentences to explain the meaning, some recent writers do not agree with Dr. Maxwell's opinion in number 7 below. They hold that correct use in a sentence is a serviceable way to teach the meaning of words. Compare section 295.

Kinds of Oral Composition

1. All answers to questions should be given in complete statements.
2. Discussion of the contents of the reading lesson.
3. Reproduction of stories told or read by the teacher.
4. Description of processes in arithmetic and manual training.
5. Separation of sentences into their complete subjects and predicates.
6. Recitation of prose and poetry.
7. Explanation of the meaning of words. Putting words into sentences is not a method of teaching the meaning of words, but a method of determining whether the meaning of a word is known.

Kinds of Written Exercises

328. Optional classification. — Some kinds of written work are suggested here, but other classifications are accepted. Teachers will see the necessity of using oral work in connection with transcription, dictation, forms of correct expression, reproduction, paraphrase, abstract, and elaboration.

329. Transcription or copying. — Much importance is placed upon the habit of copying correctly from the board, paper, or books. Very few advanced pupils are able to copy accurately, because they never formed the habit of doing so in the primary grades. This exercise may be directed so as to teach or review capitalization, punctuation, unity of the sentence, sequence of thought, and paragraphing. Select material that is interesting and intelligible, and then require absolute accuracy. Do not make these exercises too long or too frequent.

330. Dictation. — Exercises in dictation have a wide use in applying the principles of composition, and especially in forceful drilling to correct errors. Dictation exercises teach the child to put on paper what is in his mind, thus helping to make the transition from spoken to written language. Use exercises having ethical or literary content. If the exercises for dictation are taken from the books used by the pupils, self-criticism is made easy and practical.

331. Forms of expression. — Exercises on correct forms of expression will habituate the pupils to the proper use of words before the technical reasons are understood. It is a good plan to devote at least five minutes a day to oral exercises of this nature. Repeat the essential exercises day after day until the form sounds right to the children. Remember that it is the ear that gives us most of our habits of speech. Only oral repetition will fix the correct habits. Keep a list of the errors frequently made, and then arrange the dictation exercises accordingly. These exercises include such words as *is* and *are*, *have* and *had*, *doesn't* and *don't*, *shall* and *will*, *may* and *can*, double negatives, and other common errors.

332. Reproduction. — This form of composition exercise means the recalling of the exact words of the author. This restricted meaning of reproduction may not be accepted outside of New York City. Here and elsewhere the selections for reproduction should be models in thought and style.

333. Paraphrase. — This exercise means the expression of another's thought in one's own language. It is helpful in causing a pupil to get the thought expressed in a given passage; but many educators consider it a

harmful exercise because it degrades the author's beauty of style and thought. Better to memorize the selections for reproduction.

334. Abstract. — A condensed statement of the substance of another's thought in one's own language is an abstract.

335. Elaboration. — This term is the converse of abstract writing. Brevity characterizes the abstract; enlargement and elucidation are characteristic of elaboration. It is an exercise conducive to freedom of thought and expression in narration, description, and exposition.

336. Kinds of written composition. — Description, narration, and exposition are three kinds used in elementary classes. Description presents the appearance of things; narration presents a series of actions or happenings; while exposition seeks to explain the meaning of things. For a satisfactory treatment of how to teach these and other kinds of elementary composition, see Maxwell and Johnston's *School Composition*, or any other good text.

337. Problems. — The difficulties or problems in teaching composition may be summarized as follows:

1. The selection of subjects, topics, or themes.
2. How to conduct the recitation preparatory to writing.
3. Criticism and correction.
4. The use of models in 1, 2, 3.

338. Selection of subjects. — Three considerations are sufficient.

1. Principles. Same as in section 322.
2. Correlation. Select subjects from history, geography, and other grade work. This kind of selection comes under the principles in 1.

3. Avoid such abstract subjects as Vanity, Ambition, The Growth of Pessimism. This suggestion is also under the principles in 1. Teachers are frequently asked for a positive suggestion on the selection of subjects, and so 2 is given; for negative suggestion, use 3.

339. Some suitable subjects.

FOURTH YEAR

Science. Coal and Its Uses.
Geography. The Harbor of New York.
History. Henry Hudson.
Biography. Longfellow.
Personal experience. A Visit to the Museum.

FIFTH YEAR

Subjects similar to those in Fourth Year.
Narrative. The Boyhood of Lincoln.
Descriptive. The Making of a Base Ball.

SIXTH YEAR

Advantages of the Panama Canal.
The Aunt in Snow Bound.
Why I Like Whittier.
The Necessity of Bathing.
What I Should Do with a Thousand Dollars.
The History of Our Flag.

SEVENTH YEAR

Narration. My Progress in Four Years.
Description of a picture. The Signing of the Declaration of Independence.
Exposition. The Uses of Our Forests.

Argumentation. Virginia vs. Massachusetts in American Progress.

Science. Wireless Telegraphy.

History. The Decisive Effect of the Battle of Saratoga.

Geography, History, and Literature in Evangeline.

EIGHTH YEAR

My Favorite Character in the Deserted Village.

The Kinds of Levers.

My Opinion of Webster as an Orator.

The Power of Simple Words in the Gettysburg Speech.

The Causes of the Mexican War.

340. The model as a preparation for writing. — See specific directions in *School Composition*. We shall prepare the class for writing by studying, analyzing, and imitating a model. Another exercise will deal with the preparation of original material.

341. The selection of a model.

1. Select a model from some book in the class. Every pupil should have a copy in his hand. Why? See last two sections in geography.

2. Select a model that the class will appreciate. There can be no culture value in interpretation that lacks appreciation.

3. Select a model having some rhetorical excellence, such as clearness, choice of words, or good outline.

342. The study of the model. — Suppose the model selected is The American Indians, a prose selection in the class reading books.

1. Pupils read selection to get the general nature of the selection.

2. Second reading for the more careful treatment of

important parts, the aim being to bring about an appreciation of the beauty of the selection rather than to accumulate a fund of information concerning words or allusions. But there is special attention given to what words are used and how they are used; to structure, capitalization, and punctuation of sentences; to unity, continuity, and topic sentence in each paragraph. This analytic study reveals the structure of the parts and the whole, and also enables the class to make an outline showing the thought or plan of the author.

3. A third reading will give increased appreciation and leave the selection as a unit in the pupils' minds.

343. Imitation of the model. — The study of the model gave us an outline. It shows the thought in the author's mind and the arrangement or plan in the selection. It follows:

THE AMERICAN INDIANS

I. INTRODUCTION. Probable origin of the Indian race.

II. BODY.

1. Physical appearance and dress.
2. Manner of living; occupations, pleasures.
3. Relation to the white people, as friend and as enemy.
4. Future of the Indians.

III. CONCLUSION. A peculiar type of man in American life.

Now have the pupils give the substance of the selection, using their own oral wording.

Observe outline again. Take The Eskimo for a subject and write a composition according to this same outline. A kindred subject is considered better than

the same subject, as the latter invites too much use of verbal memory.

344. The model in criticism. — Now the compositions on The Eskimo are ready for criticism, supposing that a day or more has elapsed since the compositions were written. Comparison with the model is the process; and the points to be observed are the ones observed in the study of the model. This first criticism by comparison should be done by teacher and pupils working together.

345. Outlines. — The study of the paragraph leads to the use of outlines. In the fourth grade the teacher should co-operate with pupils in making outlines and then have pupils compose orally on these outlines before writing. Some hold that this making of outlines produces mechanical, uninteresting, and unimaginative writing; but, on the other hand, the weight of opinion favors the plan as a means of securing unity and continuity of thought.

346. Purposes of outlines.

1. To aid in the gathering of material.
2. To secure its proper organization and condensation.
3. To secure the logical order of topics.
4. To leave the mind of the writer free for the expression of his ideas.
5. To prevent wandering.
6. To fix the habit of clear, logical thinking.

347. Composition without model. — The time will come, of course, when pupils will write compositions without using a model as a preliminary preparation. The model is only a *type*, and so the model is not required after the type has become familiar. In such cases, a regular order of procedure may be used.

1. Assignment of theme.

2. Books should be read, lessons reviewed, subjects investigated; in short, information gathered from all convenient sources.

3. Oral discussion for summarizing, condensing, and organizing material.

4. Write outline.

5. Oral composition following outline. This may be omitted in the higher grades.

6. Write composition.

348. Criticism of compositions.

1. By pupil acting under general direction of teacher. Have first reading for paragraph structure; second reading for sentence structure covering concord of subject and predicate, adjective and noun, pronoun and antecedent, etc.; third reading for spelling of every word.

2. By use of the model. Typical composition read or written on board, and then each pupil corrects his own.

3. Interchange of compositions.

4. By the teacher. This is necessary once a month as a means of estimating the work of the class, but it is not approved for regular weekly criticism. It mortgages teacher's time which should be reserved for rest or change of work; it violates the principle of self-activity of the pupil; it is practically useless unless the compositions be returned and the pupils be led to avoid similar errors in the next composition.

349. Suggestions on criticisms.

1. Teach pupils to consult grammar, dictionary, book of synonyms, and any other helpful references. This will aid self-criticism and at the same time teach pupils how to study.

2. Reject all slovenly work and, if due to carelessness, have the composition rewritten.

3. Do not try to read all compositions. Select a representative group and then make these the subject of criticism.

4. Establish a standard of excellence and adhere to it.

5. Treat individual difficulties in brief, personal interviews.

6. Give maximum praise for every indication of improvement.

7. Use constructive criticism. The child must think as a child and write as a child.

8. Assist pupils to clear thinking. The outline aids clearness.

9. Use a simple code of marking. One is given in Maxwell and Johnston's *School Composition*, page 223. Place code on a chart in the front of the room.

10. Give oral drill on errors found to be general.

Structural Errors

350. Too many rules. — We do not expect pupils to acquire a finished literary style during eight years in the elementary grades, but we do expect to find fewer structural errors from year to year. One cause for disappointment is the number of rules given for guidance. Nearly all the points can be grouped under the sentence and the paragraph; and the only safe remedy for recurring errors is to return to a review as suggested in the next two paragraphs.

351. The sentence. — It is a matter of discussion whether the sentence or the paragraph should be considered the unit in composition. Reserving the decision,

the teacher must teach the individual sentence before pupils can become proficient in composition. Spelling, capitalization, punctuation should be observed in all grades; recognition of subject and predicate in primary grades; simple, compound, and complex sentences with word, phrase, or clause modifiers in grammar grades. Neither subsequent construction nor criticism can be intelligently done if pupils fail to master a working knowledge of the sentence.

352. The paragraph. — If we view composition work as a whole, the paragraph is the unit of thought. Lower primary pupils may be able to think only in sentences, but pupils in grades four to six can understand the use of the paragraph. The concept of the paragraph is most easily secured by the analytic study of a model. Such a study will reveal the writer's plan made up of beginning, middle, and end; or, as the parts are called later, introduction, body, and conclusion. An oral discussion of the plan or outline will lead to an interpretation of this framework of the paragraph; and then, following that outline, the pupils may write a paragraph; the last process is comparison and criticism. This exercise embodies analysis and synthesis.

Pertinent Questions Answered

353. Rewriting compositions. — *Should pupils be compelled to rewrite all compositions for the purpose of approximating perfection?*

No. Such expenditure of time in the correction of errors does not seem prudent. Better write another composition and thus apply principles of correction.

354. Occasional rewriting. — *Should compositions ever be rewritten?*

Yes, if carelessly done. Have the work done as extra work. If pupils write thirty compositions a term, it is thought useful to have four or five perfect compositions in the set.

355. Original drafts. — *Are original drafts kept for reference as an indication of progress?*

Yes. Many teachers prefer to have a separate book for composition, so that the pupil may have a guide to his own progress.

356. Ink or pencil. — *Are first copies written in ink or pencil?*

Pencil in lower grades; ink in upper grades.

357. Envelopes. — *When letters are written, does the addressing of the enve'ope (or rectangle representing same) form part of the exercise?*

Yes.

358. Consulting references. — *Do teachers allow pupils to consult dictionaries and other such aids during the composition lesson?*

Yes. Teach pupils to use all helpful material.

359. Choice of model. — *Should a model be constructed by the teacher?*

No; make a selection from good literature.

360. Cause of errors. — *Are errors due to carelessness or ignorance?*

Most of the errors are due to carelessness. The pupils rely upon the teachers to find and mark the errors.

361. Time before criticism. — *How long a time usually elapses between the writing of a composition and its correction by pupils?*

If possible, allow at least two days to elapse. Authority is against correction during the same period, since pupils should not be expected to change their

mental attitude within a period of forty minutes or an hour.

362. Effect of criticism. — *Does criticism tend to check spontaneity and originality?*

With conscientious pupils, yes; with indifferent pupils, no. The tendency toward sympathetic, constructive criticism is no likely to produce unsatisfactory results.

363. No criticism. — *Do you ever have compositions on which no criticism is made?*

Yes, to encourage individuality. Let it be known in advance that the productions are to be read by the writer without oral or written criticism.

364. Signature of critic. — *When pupils correct the compositions of others, do you require the critics to sign their names?*

Always. This allows the right of appeal to the critic or the teacher. It fosters criticism rather than fault-finding.

365. Colored pencil used. — *Should teachers use colored pencil or black pen or pencil when they correct compositions personally?*

Colored pencil. Economy of time for teacher and pupil in reviewing marking.

366. Errors indicated. — *Do teachers indicate errors, or actually correct them?*

Indicate the errors.

367. Self-correction. — *In what grade may self-correction be advantageously introduced?*

As soon as pupils are capable of writing a sentence, they should begin self-criticism. Their knowledge of self-criticism should increase with their general knowledge. It is a part of self-realization. Hence, self-criticism can be justified in all grades above the third.

368. Time limits. — *Is a time limit assigned?*

Yes, in school; on original composition at home, no. But it is advisable to habituate pupils to approximate time limits at home as well as in school. They must meet such requirements in business.

369. Pupils choose subjects. — *Do you ever allow pupils to choose their subjects?*

Yes, within specified limits. Unlimited choice leads to vacillation and consequent loss of time.

370. Reading best work. — *Should the best compositions be read at morning exercises?*

Yes; this establishes an honor standard.

371. Writing poetry. — *Are your pupils encouraged to write poetry?*

Yes, occasionally. Every class can produce some meritorious poems.

372. General progress. — *Is the habit acquired in composition work strong enough to be effective in the written exercises in other subjects?*

Yes, if there is a good spirit among the teachers. When a school exacts a certain standard of excellence, the pupils respond.

An Examination Question Answered

373. The question. — (1) *What is the relative value of composition in school work?* (2) *How should outlines be used?* (3) *Give an effectual method of criticism.* (4) *Discuss the scope and method of correction.*

(1) Composition is one of the most important exercises in school work. It is a means of expression in all the other studies, and it can be made an efficient test of general intellectual progress.

(2) Outlines should be used as guides in the selection and arrangement of important points. Pupils should be

taught to make their own outlines by study and analysis of model compositions. Take interesting selections from such writers as Hale, Irving, Alcott, Thoreau, or any others liked by the pupils; read the selections and make a list of the topics. Have children reconstruct stories from given outlines and then compare their compositions with the model.

(3) Have compositions read in class and criticised favorably by teacher and pupils. Try to arouse the interest of the pupils by encouraging them to do their best to merit the approbation of their associates.

(4) Teachers should not pass valuable time in correcting compositions. Make the pupils critics of their own work. In this way the pupils will learn to find their own errors, amend them as well as they can, and try to avoid similar errors in the future. Following are some rules to train pupils to criticise and correct their own compositions: " (1) Give the pupil all needful books of reference, and teach him how to find what he wants. (2) Have the pupil look for only one class of errors at one time. He should examine (*a*) his outline; (*b*) his sentence structure; (*c*) his capitalization, punctuation, and spelling. This would necessitate three careful readings of his composition." See Maxwell and Johnston's *School Composition.*

Primary Language

Attention is directed to PLANS AND DETAILS OF PRIMARY LANGUAGE WORK, by Catherine L. O'Brien; published by the author of METHODS IN EDUCATION; 50 cents postpaid.

This is a comprehensive treatment of all phases of language work in the first four years of the elementary

school. The schedule of lessons for daily, weekly, and monthly assignment satisfies all the requirements of the Elementary Course of Study in New York City, and yet the scheme is flexible enough to suit the needs of primary schools in other localities. To give greater efficiency in using references, Miss O'Brien has cited references by pages for every topic treated in the four years of language study. No other one publication on elementary language work gives so much specific guidance to teachers, principals, and superintendents.

CHAPTER XI

GRAMMAR

374. Value of technical grammar. — A third phase of language study in the elementary school is formal grammar. The works of literary art in the readers, re-enforced as they ought to be by supplementary reading at home of the whole works from which the selections for the school readers are made, will educate the child in the use of a higher and better English style. Technical grammar never can do this. Only familiarity with fine English works will insure one a good and correct style. But grammar is the science of language, and as the first of the seven liberal arts it has long held sway in school as the disciplinary study *par excellence.* A survey of its educational value, subjective and objective, usually produces the conviction that it is to retain the first place in the future. Its chief objective advantage is that it shows the structure of language, and the logical forms of subject, predicate, and modifier, thus revealing the essential nature of thought itself, the most important of all objects because it is self-object. On the subjective or psychological side, grammar demonstrates its title to the first place by its use as a discipline in subtle analysis, in logical division and classification, in the art of questioning, and in the mental accomplishment of making exact definitions. Nor is this an empty, formal discipline, for its subject-matter, language, is a product

of the reason of a people not as individuals but as a social whole, and the vocabulary holds in its store of words the generalized experience of that people, including sensuous observation and reflection, feeling and emotion, instinct and volition. — *Report of Committee of Fifteen*, page 48.

375. Scope of this chapter. — In this chapter it is not necessary to try to cover every point in grammar. Approved text-books suggest suitable methods of presentation in accordance with the characteristic plan of development of such texts. It is necessary, however, to present some of the most important and most difficult parts; and so we have selected what may serve as types in the matter presented and in all related matter. Thus the plan of teaching the noun clause is a distinct type of mental procedure which may be followed in teaching adjective clauses and adverb clauses.

376. A habit of thinking. — One specific value of grammar is the habit of mental activity acquired by an orderly way of attacking each sentence. Teach children to read the sentence, to find the principal parts, to select and classify the modifiers, and then to dispose of the independent elements. Teach the fundamental facts; and make all pupils feel that a mastery of the simple sentence means a mastery of nearly all grammatical relation. In this way, grammar will not remain a synonym for what is difficult or impossible.

377. Facts before conclusions. — In regard to mental processes, teachers are urged to habituate pupils to observe the facts first and then draw the conclusions. We may illustrate this by taking one sentence.

Pupils work faithfully

Teacher. What part of speech is work?

Pupil. Work asserts action; hence, work is a verb. Or this answer: Work is a verb because it asserts action.

These two answers illustrate two mental processes, each tending toward a habit. Which process is preferred? The former requires attention, thought, judgment. It is the empirical, scientific method: observation, facts, conclusion. The second process is conducive to guessing and inactivity. Answers are given quickly, but the responsibility of testing the answer is shifted to the teacher. Cross-examination follows and frequently induces the pupil to change his opinion. Deliberate reasoning in the first instance is a clear gain for the pupil even though time is precious. One clear concept in the beginning of any process in grammar will obviate hours of drill in subsequent work.

378. The syllogism. — A closer analysis of the mental process just mentioned shows that pupils are constantly using the syllogism. Thus in the sentence given, what part of speech is faithfully? The child observes the word and then his thought follows this form:

Whatever modifies a verb is an adverb. Major premise.

Faithfully modifies the verb work. Minor premise.

Therefore faithfully is an adverb. Conclusion.

379. Fundamental facts in grammar. — In treating the subject of errors in composition, we reached the decision in favor of going back to a simple classification under sentences and paragraphs. Some teachers make a chart of essentials under words, sentences, and paragraphs, and keep that chart in sight for daily use until

those essentials become a part of every pupil's mental equipment. This is ideal instruction. As technical grammar is not usually studied until the fifth or the sixth year, any normal child comes to the study of grammar with an apperceiving mass which embodies two or three years of systematic language work on words and sentences and, to a certain extent, on the paragraph. The first lessons in technical grammar are, therefore, simply an interpretation of English which the child is able to construct or comprehend. The transition requires the use of new terms, but the interpretation of the sentence is not a new process. Difficulty arises because teachers do not hold to the mastery of basal facts. Three thoughts deserve consideration: the sentence, parts of the sentence, parts of speech. Nearly all of the relations comprehended in these three are simply classified in the following five statements:

1. The typical English sentence has two principal parts, subject and predicate. The subject may be noun or pronoun; the predicate must be a verb.

2. All modifiers of the subject have the nature of adjectives.

3. All modifiers of the predicate have the nature of adverbs.

4. A sentence may have a third principal part, namely, a complement. An object complement may be noun or pronoun; attribute complement may be noun, pronoun, or adjective. All of these parts of speech are known from drill on the first three fundamental facts.

5. Simple sentences may be combined into compound or complex sentences by the use of connectives.

380. Development based upon fundamental facts.— It is not supposed that the foregoing classification can

be mastered in one term, but every step in grammatical study will be made secure if the child is taught to use that criterion during the first term. The syllogism is unconsciously used every time a child goes back to test himself by one of those five statements. In brief, the purpose of such a guide is to teach pupils how to study. An elaborate treatise on teaching how to study may be more welcome to the disciples of theory, but every successful teacher knows that the best results cannot be secured unless the guiding process is simple enough for children to understand and interesting enough to follow. This plan has met these two requirements. The following procedure suggests the general development under this plan.

1. *Flowers bloom.* All is new: sentence, subject, predicate, noun, verb.

2. *Pretty flowers bloom early.* Known, same as 1; unknown, adjective and adverb.

3. *The pretty flowers of spring bloom early in our field.* Here we have added another adjective, a pronoun, a preposition, and phrases. The adjective and the adverbial uses of these phrases are known from 2. The phrase is simply a new form.

4. *The pretty flowers of spring bloom early and late in our fields.* Conjunction is new.

5. *Children like daisies. The daisy has petals. Children pluck them. The daisy is the day's eye. The daisy is pretty. Who brought the daisies? It was she.*

Here we have the purpose to present third principal part of sentence; new, names object and attribute; related old, nouns and pronouns and adjectives in third part of sentence.

6. *Flowers bloom.* Simple. *Summer comes.* Simple.

Flowers bloom and summer comes. Compound. *Flowers bloom when summer comes.* Complex.

Notes on Plan of Development

381. Types. — These suggestions embody a basis or type of procedure in studying all the related parts of a sentence. This matter is merely an outline; more material is required for a full presentation.

382. Independent elements. — The interjection may be studied with nominative absolute and other independent elements.

383. Simple sentence first. — Too much emphasis cannot be placed upon a thorough knowledge of the simple sentence. Master the declarative sentence first, and then the other kinds from form of expression appear as easy modifications of the declarative form. All the parts of speech, too, may be studied in the simple sentence. A knowledge of nouns, adjectives, and verbs is a direct approach to participles and infinitives; and adding the adverb, you have the foundation for all kinds of phrases and clauses. See development lessons following.

384. Maxims applied. — The process of development mentioned employs the maxims known to related unknown, simple to complex, from whole to parts. Interest is stimulated and apperception is assured. Teachers understand, of course, that the study of the simple sentence means more than analysis. Synthesis of given parts, original construction, reconstruction, filling blanks, and the various composition exercises will all be used to satisfy the needs of the pupils.

385. Content of illustrative sentences. — While it is advisable to use material that is familiar and interest-

ing, there is no reason for using sentences that do not express a valuable thought. The following sentences are suitable:

1. Birds sing.
2. Respect the flag.
3. Bees gather honey.
4. The whale is an animal.
5. Plants need air and moisture.
6. Fawns are graceful.
7. The Mohawk valley is fertile.
8. The *Mayflower* sailed from Plymouth.
9. Icebergs from the Arctic Ocean melt in the Gulf Stream.
10. Magellan's ship sailed around the globe.
11. The territory claimed by the Dutch was called New Netherlands.
12. Staten Island has an area of nearly sixty square miles.

386. Oral analysis. — This process does not receive sufficient attention. When used according to an orderly plan, it requires close, accurate thinking; it is a means to mental and physical poise; and it has the twofold value of developing the power of oral and written expression at the same time it is interpreting the oral or written expression of others. The diagram becomes more useful when it is supplemented by oral analysis.

387. Diagrams. — A diagram is a graphic representation of the grammatical relations in the sentence. Some systems are too elaborate for practical use, but a simple and reasonable system of diagrams means economy of time, interested self-activity of pupils, and co-ordinated multiple sense instruction. The rule of limitation of use may be put this way: Use diagrams whenever they

satisfy the purpose of instruction in grammar. It is an abuse of diagrams to make them displace all oral analysis and parsing.

388. Drill. — The schools fail to give adequate drill. In the effort to cover the assigned limit of work, teachers present new matter day after day and then wonder why pupils have not retained the matter which was so carefully presented. The average pupil will not give himself the drill alone; drill is essentially the work of the recitation period. It should be simple, specific, frequent; and instead of repeating in all the lessons in this chapter, we offer the following suggestions for kinds of drill:

1. Use sentences that clearly illustrate the point of the lesson. Unnecessary elements in the sentence are likely to draw the attention away from the one point under consideration. This is specific, deductive application to complete the inductive process. It is the passing from the general notion to the particular notion.

2. Application in sentences found in the grammar. Habituate pupils to use the text-book as authority in grammar.

3. Use sentences in history, geography, reader, etc. This is another attempt to show pupils where to find suitable material. It tends toward independent study, as every pupil has a book; it permits physical adaptability, according to sight, comfortable position, etc.; it is correlation of studies.

4. Synthesis of sentences from given lists of words, phrases, or other elements. This appeals to the constructive instinct of children. It may also be used as a stimulus in competitive effort.

5. Pupils find sentences in books or construct original sentences.

6. Memorize mottoes, maxims, or other quotations that will serve as typical illustrations.

7. Apply grammatical knowledge in writing and in criticising compositions.

8. Pupils prepare questions for oral or written review or examinations. A good question requires a knowledge of subject-matter, and experience proves that the average class makes such requisite mastery if the teacher uses the questions prepared by the class.

9. Correlation as a preliminary drill in primary grades before beginning the study of formal grammar.

389. Parsing literary masterpieces. — The value of parsing as an educative process should be approved as only one of the useful exercises in grammar. The sentences used in parsing must satisfy interest and culture. The question arises, then, whether we should use literary masterpieces for this purpose. Does the dissection by analysis and parsing destroy the literary value of the selection? We quote from the *Report of the Committee of Fifteen*, page 49.

"A training for four or five years in parsing and grammatical analysis practiced on literary works of art (Milton, Shakspere, Tennyson, Scott) is a training of the pupil into habits of indifference toward and neglect of the genius displayed in the literary work of art, and into habits of impertinent and trifling attention to elements employed as material or texture, and a corresponding neglect of the structural form which alone is the work of the artist. A parallel to this would be the mason's habit of noticing only the brick and mortar, or the stone and cement, in his inspection of the architecture, say of Sir Christopher Wren. A child overtrained to analyze and classify shades of color —

examples of this one finds occasionally in a primary school whose specialty is 'objective teaching' — might in later life visit an art gallery and make an inventory of colors without getting even a glimpse of a painting as a work of art. Such overstudy and misuse of grammar as one finds in the elementary school, it is feared, exists to some extent in secondary schools and even in colleges, in the work of mastering the classic authors."

390. False syntax. — There is some difference of opinion about the advisability of using faulty sentences for correction. The objection is supported by the argument that the child is more likely to remember the incorrect form than the correct form. He will image the incorrect form by visualization instead of remembering the correct form which he reaches through abstract reasoning. But this argument is not convincing. The writing of the correct form gives the pupils the same opportunities for visualization; and, besides, comparison and contrast will intensify the impression of the correct form. Another consideration in favor of using false syntax is the fact that nearly all the leading text-books in grammar contain such exercises. See the last section in this chapter.

" The author is utterly at a loss to conceive on what principle the introduction of faulty sentences for correction can be objected to. Specimens of bad spelling for correction are injurious, because, in English, spelling is not reducible to fixed rules, but is for the most part a matter of simple recollection, and if the eye gets accustomed to the look of ill-spelt words, it is often difficult to recollect the correct mode of spelling them. Syntactical errors are of a totally different kind. They admit of being corrected on fixed principles; and as the

learner is pretty sure to meet with numerous examples of faulty sentences, both in conversation and in reading, it seems desirable that he should have some practice in the correction of those mistakes which are of most frequent occurrence. Those who object to exercises of this kind should, to be consistent, exclude from books on logic all specimens of fallacies given for the purpose of correction. Yet those who have studied and taught logic are aware that few exercises are more beneficial." — Mason's *English Grammar*, Ed. 1861, p. 173.

391. Types of lessons. — The material furnished in these lessons is intended to give one sound method of presenting each topic, but teachers are not supposed to think that there is no other material or no other way that can be considered acceptable. No matter what the topic for presentation may be, a tactful teacher will find other ways of adapting the work to individuals and to classes.

392. Parts of speech. — The one fundamental fact to be impressed in teaching the parts of speech is that words are classified according to their use in the sentence. Pupils who work upon this basis find it necessary to observe the use of a word in every instance rather than to rely upon mere memory in giving definitions. Another point which needs emphasis is that the words must be used in sentences. No word can be classified as a part of speech in grammar until that word is given a correct use in a sentence. Under this interpretation the teaching of nouns, pronouns, or other parts of speech from miscellaneous lists of words cannot be justified.

The old way of teaching the parts of speech required pupils to memorize definitions and then apply those definitions. It was the deductive method. Modern

investigation of the process of learning requires the inductive method, as we have already shown. The same general plan of teaching all the parts of speech is, therefore, a combination of inductive and deductive. Let us take a lesson on the noun.

393. Development lesson on the noun.

I. PREPARATION. The preparation in this lesson illustrates an instance where the teacher should not pass much time in reviewing the work already covered in grammar. It is possible that pupils know the sentence, the subject, and the predicate, but it is doubtful if much time passed upon reviewing these three terms would serve as a useful preparation for a lesson on the definition of the noun. Perhaps the best preparation in a lesson of this kind is to go directly to the presentation after telling the pupils that we are beginning to make an effort to tell the names of all the kinds of words used in speaking and writing.

II. PRESENTATION.

1. Mt. Vernon is in Virginia.
2. Mt. Vernon was Washington's home.
3. Mt. Vernon is near the Potomac River.
4. The house has a large porch.
5. High columns support the roof.
6. Martha Washington had a pet cat.
7. A hole was cut in the door for the cat to enter Martha's bedroom.
8. An old negro watches Washington's tomb.
9. The tomb is locked.
10. The keys were thrown into the Potomac River.

This series of sentences gives enough name words to be used in developing the definitions. The series of sentences forms one general thought which may be a

source of interest to young children if the teacher will fill out some of the details suggested. It is not necessary to ask and answer questions here; teachers can use their own ways.

III. APPLICATION. Similar sentences may be used in applying the definition that a word used as a name is a noun. The use of simple sentences will give drill enough for one lesson. Succeeding lessons should employ sentences made from lists of words furnished and also original sentences constructed entirely by the pupils.

394. Development lesson on attribute complement. — See section 233.

395. Predicate adjective and adverb modifiers distinguished.

I. AIM. To determine the correct use of the predicate adjective and the adverb modifier.

II. PREPARATION. Define and illustrate subject, predicate, noun, verb, adjective, adverb, and adverb of manner.

III. PRESENTATION.

1. That boy appears prompt.
2. That boy appears promptly.
3. The sun shines bright in my old Kentucky home.
4. The sun shines brightly on Kentucky homes.
5. The horses are running wild on the prairies.
6. The horses are running wildly from the prairie fire.
7. The ship returned safe.
8. The ship returned safely through the rocky channel.
9. The pupils are faithful.
10. The pupils worked faithfully.

The presentation is simply an application or drill upon the definitions called for in the preparation. The

adjectives in sentences 1, 3, 5, 7, and 9 denote a condition of the subject; the adverbs in sentences 2, 4, 6, 8, and 10 express manner of performing an act. This distinction suggests the rule. Use the predicate adjective to denote a condition of the subject; use the adverb modifier to express manner.

IV. DRILL. Recall the verbs generally followed by an attribute complement, namely, be, become, appear, seem, feel, look.

1. Be kind.
2. Try to become courteous.
3. You appear well.
4. You work well.
5. This distinction seems easy.
6. Do you feel good?
7. Stand and sit erect.
8. The door stands open.
9. You will grow taller.
10. You will grow rapidly.

For further drill use the device allowing a choice and have each choice justified.

1. awkward, awkwardly. The blind musician felt —— for a place to rest.
2. good, well. The child worked —— on his lessons.
3. glad, gladly. The children appeared —— when they were promoted.
4. strong, strongly. The cable is made —— enough to support a ton.
5. kind, kindly. The teacher spoke —— to the class.

Correct these errors and give reasons:

1. How are you? I am nicely.
2. She looks beautifully.
3. The team played good.

4. The food tastes very nicely.
5. Start quick and walk slow.

396. Personal pronoun and relative pronoun. — This exercise is put under one treatment to show the value of pronouns in the economy of expression. There is material enough here for two lessons.

I. AIM. To show that personal and relative pronouns are sources of economy and euphony in expression.

II. PRESENTATION.

SECTION I

1. Lincoln was President. Lincoln delivered the Gettysburg Speech.
2. This is Frank. Frank's declamation won first honors.
3. Mason was an active boy. Mr. Loring liked Mason.
4. See that bicycle. Harry Ransom made that bicycle.
5. The pocketbook was the prize. The pocketbook was given to the best speller.

SECTION II

1. Lincoln was President. *He* delivered the Gettysburg Speech.
2. This is Frank. *His* declamation won first honors.
3. Mason was an active boy. Mr. Loring liked *him.*
4. See that bicycle. Harry Ransom made *it.*
5. The pocketbook was the prize. *It* was given to the best speller.

SECTION III

By the use of the relative pronoun each pair of sentences can be combined into one sentence.

1. Lincoln was the President *who* delivered the Gettysburg Speech.
2. This is Frank *whose* declamation won first honors.
3. Mason was the active boy *whom* Mr. Loring liked.
4. See that bicycle *which* Harry Ransom made.
5. The pocketbook was the prize *that* was given to the best speller.

The sentences given in the three sections are closely related in wording and meaning so that pupils may employ their energies upon the differences in wording. Section II illustrates how a personal pronoun may avoid the repetition of nouns; the last five sentences illustrate how relative pronouns avoid the repetition of nouns and also improve the expression by uniting the two parts into one good sentence. Test the three sections by the sense of hearing and notice the pleasing effect in the last five expressions.

Shall and Will

397. Meaning and use. — In early English *shall* was the past tense of a verb meaning *to owe* or *to be under obligation to do.* In its present use with other verbs to form the future tenses, *shall* has lost nearly all of its early sense of obligation excepting in the second and third persons. *Shall* in the first person denotes simply future time; in the second and third persons, *shall* denotes promise, command, or threat.

Will is from another old verb meaning *to choose, to desire,* or *to be willing to do.* It used to show that the subject had the power *to determine* the action. *Will* in the first person still retains the original meaning, but not so in second and third persons. In these two *will* denotes simply future time.

Statements and Commands

398. Rule. — In the first person, *shall* expresses simply future time; in second and third persons, *shall* expresses promise, command, or threat. *Will* in the first person expresses promise, command, or threat; in second and third persons, *will* expresses simply future time.

1. I shall go to Europe this summer.
2. You shall remain here to study.
3. He shall study this lesson in grammar.
4. I will help you.
5. You will be ready for me.
6. He will work with us.

399. Rule. — *Shall* may be used in the second and the third persons for prophecies and promises

1. You shall have your reward.
2. Thy future shall lead to flowery paths.

In Questions

400. Rule. — In the first person, use *shall;* in second and third persons, use whichever auxiliary is expected in the answer.

1. Shall I recite?
2. Will you read our answers?
3. Will your father insist on punctuality? He will.
4. Shall your son be punctual? He shall

Should and Would

Should is the past tense of *shall. Should* has the same general uses as *shall,* but *should,* in all persons, retains its original meaning of duty or obligation.

Would, the past tense of *will,* is governed by the general rules applying to *will.*

401. Applications. — Give reasons for *shall, will, should,* and *would.*

1. Truth, crushed to earth, shall rise again.
2. We shall study.
3. We will study.
4. If I can't pray, I will not make-believe. — *Longfellow.*
5. She could not think, but would not cease to speak. — *Crabbe.*
6. There is no *if* in the case. That we shall succeed is certain. — *Nelson.*
7. The union must and shall be preserved. — *Jackson.*
8. Heaven never helps the man who will not act. — *Sophocles.*
9. I would rather be right than be president. — *Clay.*
10. Herodotus wrote as it was natural he should write. — *Macaulay.*

402. Modes. — The study of all English presupposes the desire to interpret good English and to acquire facility in writing and speaking good English. Grammarians differ so much about the number of modes and about the distinctions between modes that it is not necessary to take a young class into these mooted questions. Our general plan of development is one of comparison and contrast. So it is in getting the different kinds of sentences from form of expression, in distinguishing attribute complement and adverb modifier, in developing the function of participles and infinitives. So it should be in teaching modes. The declarative form of the simple sentence furnishes an illustration of the indicative mode. The same thought expressed in the interrogative form is another illustration of the indicative mode. A thought involving doubt must be

expressed in the subjunctive form; while the imperative sentence gives the verb in the imperative mode. The following sentences will serve in this development:

1. The pupils study grammar.
2. The pupils are studying grammar.
3. Do primary pupils study grammar?
4. If you study well, you will understand grammar.
5. Study diligently one hour each day.

In helping pupils to discriminate the modes it is useful to impress upon them that the indicative mode expresses a *fact;* the subjunctive mode a *doubt;* the imperative mode a *command.* The doubt is the only point that is really new in this process of discrimination. The pupils are familiar with the expressions in the declarative form and the imperative form from their study of sentences from form of expression. Hence, as an aid in recognizing the expression of doubt, direct attention to the use of the connectives *if, though, except, unless.* Note that they simply aid in introducing a clause that is likely to contain a verb in the subjunctive mode, but the connectives alone do not make the subjunctive mode. Mode is a modification of the verb, not a modification of the conjunction.

403. Drill on modes.

1. I hate to see things done by halves. If it be right, do it boldly; if it be wrong, leave it undone. — *Gilpin.*
2. If you know the quotation, you can recite it.
3. Learn this definition well, and then you can apply it easily.
4. Do you understand the indicative mode?
5. If you can distinguish the expression of a fact from the expression of a supposition, you can distinguish the indicative mode from the subjunctive mode.

6. The subject of a verb in the imperative mode is seldom expressed.

7. If you are here, you will understand these definitions. (Fact; we know that you are here.)

8. If you are present tomorrow, we shall drill upon modes in grammar. (Doubt; we are not certain about your attendance tomorrow.)

Participles and Infinitives

404. The meaning of terms used. — Much confusion arises from the different classifications of participles and infinitives. This lack of agreement does not produce serious consequences in a school where any good textbook is followed as an authority, but it is a matter of inconvenience to students who have to pass various examinations. We meet the terms verbals, adjectival verbals, verbal nouns, participles, and infinitives. Any word derived from a verb may be called a verbal. Some grammarians adopt verbals as the general heading and then classify infinitives, gerunds, and participles as the three subordinate kinds. So it is done in Longmans' English Grammar, edited by George J. Smith of the New York City Board of Examiners. Maxwell treats infinitives as a mode of the verb and then puts the gerund and the participle under the verbals. Milne considers the gerund a form of the infinitive. Reed and Kellogg's grammar favors an explicit wording, such as, a participle used as an adjective and a participle used as a noun. For the purpose of clearness, we summarize:

Verbals

1. Participle used as an adjective; verbal adjective; or simply the participle.

2. Participle used as a noun; verbal noun; or gerund.

References

Longmans' English Grammar, 144.

Maxwell's Advanced Lessons in English Grammar, 144, 155.

Milne's An English Grammar, 189.

Reed and Kellogg's Higher Lessons in English, 65.

Participles

405. Lesson on participle used as an adjective. — There are three points to be used as a basis in this lesson: verb, adjective, noun. In this lesson we present the adjective participle.

I. AIM. To teach the participle combining the nature of a verb and the nature of an adjective.

II. PREPARATION. Review definitions and illustrations of verbs and adjectives.

III. PRESENTATION.

1. The sun rises.
2. The sun dispels the mists.
3. The sun rising dispels the mists.
4. Evangeline wandered from place to place.
5. Evangeline, wandering from place to place, sought her lover.
6. Wandering from place to place, she patiently waited her lover.
7. You recited well.
8. I heard you reciting well.
9. We, being weary, rested ourselves in the shade.

Rapid drill upon subject and predicate in each of the first three sentences. Emphatic mention of predicate verb in each of the three sentences. Then direct attention to *rising* in sentence 3.

Teacher. What part of speech is *rising?*

Pupil. Rising is a verb.

Teacher. What is the predicate verb in this sentence?

Pupil. Dispels is the predicate verb.

Teacher. Then are there two predicate verbs here?

If pupils say yes, contrast predicate verb rises in sentence 1 and rising. If pupils answer no, go at once to the question to bring out the adjective use. Is the subject sun modified or unmodified?

Pupil. Sun is modified by rising.

Teacher. What part of speech, then, is rising?

Pupil. Rising modifies the noun sun; hence, it is an adjective.

Teacher. Rising is used as two parts of speech, a verb and an adjective. We say it participates or partakes of two natures, and so it is a participle.

Silent reading of sentences 4, 5, 6. Give time for thought. The development already done should suggest to all pupils what they are to find in these three sentences. They have before them what, where, and how to study.

Teacher. Who has found another participle? If all fail, repeat process of passing from predicate verb in 4 to adjective participle in 5.

Teacher. Find the adjective participle in 6.

Pupil. Wandering is an adjective participle.

Another Pupil. Wandering is a form of the verb modifying the subject pronoun she; hence, wandering is an adjective participle.

If any pupils have failed to discover that the participle modifies a pronoun, this last answer should impress that fact. It is information from a classmate, not from the teacher nor from circuitous development.

Proceed in similar manner with the other sentences. Then have definition formed. A form of a verb, not a predicate, having the nature of an adjective and a verb, is an adjective participle.

IV. DRILL.

1. The pupils studying grammar are attentive.

2. Do you know the definition taught yesterday?

3. See the pupils writing the lesson.

4. Having finished the lesson, the class marched to the gymnasium.

5. I, knowing your ambition, offered you an opportunity for promotion.

Constructive drill follows this analytic drill.

406. Uses of participles.

1. As a noun.

(*a*) Subject and attribute. *Begging* a courtesy is *selling* liberty.

(*b*) Object of verb. Pupils enjoy *studying* history.

(*c*) Object of preposition. We receive good by *doing* good.

(*d*) Apposition. Invention, *applying* old ideas to new uses, benefits mankind.

(*e*) Independent. Generally *speaking*, interest sustains attention.

2. As an adjective.

(*a*) Modifying noun. Lessons *learned* from experience are costly.

(*b*) Modifying pronoun. *Hearing* your voice, I returned.

407. Distinctions required. — The student must distinguish the mere adjective from the participle used as an adjective, and the mere noun from the participle used as a noun. The mere adjective does not have the nature

of adjective and verb. It is simply an adjective and it usually precedes the word it modifies.

1. *Concealed* resentment is dangerous.
2. *Coming* events cast their shadows before.
3. His soul was the *pleasing* companion of his body.
4. Beauty is only a *doubting* good and *shining* glass.
5. The *growing* plant needs light, heat, and moisture.

The participle used as an adjective has the double nature of verb and adjective, usually follows the word it modifies, and may have the same complements and modifiers that verbs have.

1. Keep the pupils *working*.
2. Start the ball *rolling*.
3. The complement is the part *completing* the sentence.
4. Participles, or the words *partaking* of the nature of two parts of speech, have many uses.
5. Here is a paper neatly *written*, properly *punctuated*, carefully *thought* out, and *placed* on the teacher's desk at the appointed time.

The mere noun has a single nature. It is often preceded by *the* and followed by a phrase introduced by *of*.

1. The *handling* of money pleases some people.
2. Angry *feeling* is betrayed by the countenance.
3. The mastery of grammar is a difficult *undertaking*.
4. The *groaning* of the prisoners and the *clanking* of chains were heard.
5. Our pupils study drawing, sewing, and physical training.

It is argued by some that when drawing, sewing, etc., are simply the names of subject-matter in the recitation they are nouns. Other authorities hold that as long as such words possess anything of the nature of verbs they are still to be classed as verbals. Thus Maxwell in his

Advanced Grammar, page 155, classes drawing as a gerund.

John learns *drawing*.

Walking is healthy exercise.

To avoid mooted points on examinations, the student is advised to use an object after drawing, singing, etc., if he wishes to classify those words under gerunds.

1. The pupils practice drawing natural objects.
2. The children enjoy singing songs.
3. Do you enjoy reading English history?
4. Writing good English is a pleasing exercise.
5. Spelling ordinary words is not too difficult a task.

The gerund, or participle used as a noun, has the twofold nature of noun and verb, implies or assumes action without asserting it, and may take modifiers and complements like those of a predicate verb.

1. We should encourage *reading* good books.
2. My *going* will depend upon your *coming*.
3. *Persuading* by kindness is sometimes the making of hard tasks for one's self.
4. Your *studying* now will prevent your *worrying* at the close of the term.
5. In carefully *preparing* every assigned lesson, one is doing one's duty to the class and to the school.

408. Drill on participle used as adjective; verbal, or verbal adjective.

1. Children come rejoicing.
2. He fell at his master's feet, weeping.
3. Wounds made by words are hard to heal.
4. Your credit being good, I will trust you.
5. I, being your guardian, expected to have my way.
6. Rising to reply, Washington stood blushing and stammering.

7. The treaty having been signed, trade was resumed with Spain.

8. Pronouns denoting the person speaking are of the first person.

9. The region drained by a river system is called the river basin.

10. Columbus, seeking the back door of Asia, found himself knocking at the front door of America. — *J. R. Lowell.*

409. Drill on participles used as nouns; gerunds, or verbal nouns.

1. Let us beware of losing our enthusiasm.
2. Doing well depends upon doing completely.
3. What do you think of his writing that letter?
4. By writing slowly you may learn to write legibly.
5. Forsaking evil companions is often the first step in reform.
6. All students should form the habit of reading poetry.
7. The object in sailing west was to find a shorter route to India.
8. He that is good at making excuses is seldom good for anything else. — *Franklin.*
9. Being in a ship is like being in a jail with a chance of being drowned. — *Johnson.*
10. Talking is like playing a harp; there is as much in laying the hands on the strings to stop their vibrations as in twanging them to bring out their music. — *Holmes.*

410. Drill on participle used as a mere adjective. — Here the twofold nature is not considered; the verbal forms should be parsed as adjectives.

1. The breaking waves dashed high.
2. The creeping night stole up the hills.

3. Education is the moulding force of life.
4. Here sailing ships delight the wandering eye.
5. Now toward the early dawning east
   We speed our course away,
   With eager minds and joyful hearts,
   To meet the rising day.

   There, as we turn our wondering eyes,
   We view one constant show, —
   Above, around, the circling skies,
   The rolling seas below.

— *Cape Cod Song.*

411. Drill on participle used as a mere noun. — Notice that these forms are used to name an act rather than to express an act.

1. Slow traveling is tiresome.
2. The cackling of geese saved Rome.
3. The visitors joined in the singing.
4. Giving is more blessed than receiving.
5. A little learning is a dangerous thing.
6. The shearing of the sheep in Australia is done by machinery.
7. The setting of a great hope is like the setting of the sun. — *Longfellow.*
8. The treatment of drowning is simply to perform artificial respiration. — *Overton.*
9. Drawing, reading, writing, spelling, physical training, and declamation come in the afternoon.
10. The firing of signal guns was telegraphing by sound. It used only the hearing. But there were other ways of telegraphing that used the sight. — *E. Eggleston.*

Infinitives

412. Uses of infinitives.

1. As a noun.

(*a*) Subject. *To see* is to believe.

(*b*) Attribute. To see is *to believe.*

(*c*) Object of verb. Pupils like *to sing.*

(*d*) Object of preposition. We are about *to sing.*

(*e*) Appositive. It is easy *to find* fault.

(*f*) Independent. Every object has its face, so *to speak.*

2. As an adjective.

(*a*) Modifying a noun. I have a lesson *to teach.*

(*b*) Modifying a pronoun. Teach them *to think.*

3. As an adverb.

(*a*) Modifying a verb. They came *to study.*

(*b*) Modifying an adjective. They are eager *to study.*

(*c*) Modifying an adverb. The fruit is ripe enough *to eat.*

413. Drill on infinitives used as nouns.

1. Never fear to do right.
2. Learn to govern yourself.
3. Your aim should be to govern yourself.
4. It is not impossible to govern yourself.
5. To govern yourself is a duty in citizenship.
6. It is never too late to mend.
7. It is not all of life to live.
8. To bear our fate is to conquer it.
9. To dispute about trifles is foolish.
10. It was proposed to tax the colonies.
11. To be just is easier than to be generous.
12. To be plain with you, you have not tried.
13. It is helpful to study the life of Lincoln.

14. To submit to insult is to give occasion for it.

15. To cultivate kindness is a valuable part of the business of life. — *Johnson.*

16. In great crises, it is a woman's special lot to soften our misfortune. — *Napoleon Bonaparte.*

414. Drill on infinitives used as adjectives.

1. Have you time to study grammar?
2. Alger's stories seem to suit boys.
3. Ask them to sing patriotic songs.
4. Pupils have a desire to appear well.
5. Columbus did much to calm the sailors' fears.

415. Drill on infinitives used as adverbs.

1. There is work enough to do.
2. Are you anxious to govern yourself?
3. She is too sensible to be flattered.
4. You should strive to govern yourself.
5. You are old enough to govern yourself.
6. I paused to observe the bird's proceedings.
7. Call to see me if you happen to pass this way.

8 Irving's writings were the first to make American literature popular in England.

9. Every morning the Persian wife used to kneel at the feet of her husband and ask nine times, " What do you wish that I should do?"

416. The infinitive without to.— The verbs *bid, dare, feel, hear, let, make, need, see, behold,* and a few others, are generally followed by the infinitive without *to.*

1. The teacher bade the pupils *come* at one o'clock.
2. Would you dare *swim* in the ocean?
3. Can you *feel* yourself grow?
4. Did you hear your mother *call* you?
5. Let music *swell* the breeze.
6. Make yourself *speak* distinctly.

7. The first division need not *do* this home work.
8. Can you see the flag *wave?*
9. Behold the soldiers *march* in solid ranks.
10. Watch me *diagram* this sentence.

A Development Series

417. Words, phrases, clauses. — This development shows how to proceed from the known to the related unknown. This lesson aims to secure different forms of expression for the same thought; an exercise in amplification.

I. AIM. To increase knowledge of phrases and clauses.

II. PREPARATION. Review definitions of phrase and clause.

III. PRESENTATION. Recall the simple sentence of two words, subject and predicate; then the added adjective modifier and the adverb modifier. Have following sentences on board:

1. The athlete is a *strong man.*
2. The athlete is a man *of great strength.*
3. The athlete is a man *who has great strength.*
4. Study *here.*
5. Study *in this school.*
6. Study *while you are in school.*
7. Tell us an *historical* story.
8. Tell us a story *about history.*
9. Tell us a story *which relates to history.*
10. The guide proceeded *cautiously.*
11. The guide proceeded *in a cautious manner.*
12. The guide proceeded *as a cautious man proceeds.*

Pupils know definitions of parts of sentences, parts of speech, phrase, and clause. Now impress word, phrase,

and clause as the three kinds of grammatical elements *from form.*

All read sentence 1. Individuals name parts of sentence and parts of speech. Teacher underlines *strong.* Visualize strong. Suggest the purpose of making or finding other expressions for the same meaning. The direct statement of the purpose of this recitation will be enough to encourage a class to select, discuss, and define the phrase elements and the clause elements. These twelve sentences will furnish the analytic drill. For synthetic drill the following italicized words are suitable for expansion:

1. We respect an *honorable* pupil.
2. Washington arrived *punctually.*
3. An *honest* effort will be rewarded.
4. *Diligent* men are usually happy.
5. Franklin arose *early.*

NOTE. — The presentation in this lesson is essentially a drill. This shows that the five formal steps need not be rigidly followed in all lessons.

418. Drill on adjective clauses.

1. I that speak unto thee am he.
2. The evil that men do lives after them.
3. He is well paid that is well satisfied.
4. Men must reap the things they sow. — *Shelley.*
5. Words are the only things that live forever.
6. Put your trust in those whom you have tested.
7. He serves all who dares to be true. — *Emerson.*
8. Blessed is he who has found his work. — *Carlyle.*
9. He that plants trees loves others besides himself.
10. Choose carefully those with whom you will associate.

11. Time, which deadens hatred, secretly strengthens love.

12. Sunday is the golden clasp that binds the volume of the week.

13. That that that that boy used should have been a which.

14. We never tell our secrets to people who pump for them.

15. California is the state whose mines became known in 1849.

16. Self-respect is the noblest garment with which a man may clothe himself.

17. The power which brings a pin to the ground holds the earth in its orbit.

18. He who has resolved to conquer or die is seldom conquered. — *Corneille.*

19. Memory is the holy paradise out of which we cannot be driven away. — *Richter.*

20. It is a belief in the Bible which has served me as the guide of my moral and literary life. — *Goethe.*

419. Development: Concord of relative pronoun and antecedent.

I. AIM. To show that the relative pronoun need not agree in case with the antecedent.

II. PREPARATION. Define pronoun, relative pronoun; name the properties of nouns and pronouns.

III. PRESENTATION.

1. You are the pupils who make the school.

2. You are the pupils whose records give this school its reputation.

3. You are the pupils whom the teachers trust.

4. I dislike an eye that never twinkles. — *Longfellow.*

5. Life is a bubble which any breath may dissolve. — *Greeley.*

6. He is a free man whom truth makes free. — *Dryden.*

7. No man is born into the world whose work is not born with him. — *Lowell.*

8. Construct a sentence which will have a relative pronoun in the nominative case.

This lesson is an opportunity for real self-activity. It is application rather than the presentation of new matter. There are four inquiries for each sentence.

What is the relative pronoun?

What case is the relative pronoun?

What is the antecedent?

What case is the antecedent?

Thus in the first sentence *who* is the relative pronoun, nominative case; *pupils* is the antecedent, nominative case. Here the pronoun and antecedent do agree in case. Take the second sentence. The relative pronoun *whose* is possessive case; the antecedent *pupils* is nominative case. The pronoun and the antecedent do not agree in case. Likewise in 3, 6, 7, and 8.

IV. DRILL. For further effective drill have pupils recall, find, or construct sentences to prove that the relative pronoun need not always agree in case with the antecedent.

420. Development: The noun clause.

I. AIM. To outline a plan of teaching the noun clause. This plan is a simple way of passing from the known uses of nouns by substituting a clause for each specific use of the noun.

II. PREPARATION. Review uses of nouns as illustrated in the sentences. Say that this lesson in grammar will use material taken from a discussion in astronomy. Some astronomers say that every star is like the sun in

brilliancy, but the stars appear like small lights simply because they are so far from us. The statement spoken of in these sentences is the statement that stars are suns.

1. Subject. The statement is believed.
2. Object. Some people believe that statement.
3. Attribute. It is an interesting statement.
4. Object of preposition. Have you any doubt about the statement?
5. Appositive. This belief or statement is fascinating.

III. PRESENTATION. The preparation has gone directly to the points to be emphasized, namely, the principal uses of nouns in sentences. The pupils know the definitions of phrases and clauses. Now their efforts will be directed toward substituting the clause for each use of the noun in the sentences given.

1. That stars are suns is believed.
2. Some people believe that stars are suns.
3. The statement is that stars are suns.
4. Have you any doubt about whether stars are suns?
5. The statement that stars are suns is fascinating.

IV. DRILL. Two kinds of drill are suggested here, namely, interpretation of sentences given, and expansion. The constructive experience in making sentences to illustrate all the uses of noun clause is also advised.

1. Let us see how the earth revolves.
2. My desire is that you may become useful men and women.
3. The opinion that children are naturally bad is not favored by me.
4. Have grammarians any proof of what they say?
5. Nature teaches that there is order in her ways.
6. That you are ambitious is proved by your record.

7. The question is whether I ought to do it.

8. Can you understand that a noun clause is used like a noun?

9. Franklin learned that self-help is one way to success.

10. Trouble teaches how much there is in manhood. — *Beecher.*

Further drill by substituting and expansion is valuable in teaching the specific uses of noun clauses. Such a process in teaching is both natural and logical. It is suggested that pupils expand the italicized parts into clauses.

1. The teacher asked *the pupils to study.*
2. We believe *in the heroism of Nathan Hale.*
3. Have you read *of Arnold's sad death?*
4. *The beauty of Mt. Vernon* is fascinating.
5. Grant proved his *ability.*

421. Drill on noun clauses.

1. I saw that you were faithful.
2. Galileo taught that the earth moves.
3. We believe that the soul is immortal.
4. Many men advocate whatever seems popular.
5. Can he hold the position? is the question.
6. Where Warren fell is not precisely known.
7. That he is rich does not mean that he is happy.
8. The charge is that you have neglected your duty.
9. Who wrote the Book of Job is not positively known.
10. Much will depend upon how you write your answers.
11. It is not work that kills men; it is worry. — *Beecher.*
12. The good is always the road to what is true. — *Hamilton.*

13. I regret that I have but one life to give to my country. — *Hale.*

14. "Beautiful creature," said the fox, "you sing like a nightingale."

15. One would think that the fate of our country depends upon who will be our next president.

16. Have you any explanation of why you say that noun clauses are used as nouns?

17. The world will little note nor long remember what we say here, but it can never forget what they did here. — *Lincoln at Gettysburg.*

18. If ever it is a question whether you or the flag must perish, you will instantly choose that it shall not be the flag. — *W. T. Sherman.*

19. Have we not learned that not stocks nor bonds nor stately houses nor lands nor the product of the mill is our country? It is a spiritual thought that is in our minds. — *Benjamin Harrison.*

20. That the daring barques of the Northmen had long before found their way from Greenland to the coast of North America is likely, though not certain. What is certain is that nothing more came of their first visit. — *Goldwin Smith.*

422. Connectives: Explanation and drill. — Pupils have already had some uses of the conjunction, the relative pronoun and possibly the conjunctive adverb. The aim of this lesson is to give breadth to their knowledge of connectives. This aim may be attained by analysis to find illustrative uses and then by synthesis to impress those uses.

I. Conjunctions

1. Words. Boys *and* girls study connectives.
2. Phrases. Pupils study at home *and* in school.

3. Independent clauses. Some pupils study at home *and* then they recite well in school.

4. Noun clause. Teachers know *that* pupils need drill on connectives.

5. Noun clause. Can you tell *whether* you understand this or not.

6. Adverb clause of time. Careless people speak *before* they think.

7. Adverb clause of cause. Napoleon was sad *because* he was in exile.

8. Adverb clause of condition. *If* you understand, let us proceed.

9. Adverb clause of purpose. We study *that* we may prepare for successful living.

Correlative conjunctions mutually relate to each other. They should be placed before similar parts of speech or before corresponding groups of words.

10. Flattery corrupts *both* the receiver *and* the giver. — *Burke.*

11. There is nothing *either* good *or* bad, but thinking makes it so. — *Shakespeare.*

12. Try to observe *whether* to speak *or* to be silent.

13. Man is *neither* the vile *nor* the excellent being which he sometimes imagines himself to be. — *Beaconsfield.*

Relative pronouns. Used in adjective clauses Who, which, what, and that are the common forms. See section 418 for illustrations. The pronoun is often omitted, as in the following sentences.

1. This is the lesson you will learn.
2. Cicero is the orator you mentioned.
3. Connectives is the topic the teacher assigned.

II. Conjunctive Adverbs

The name is derived from the double function of conjunction and adverb. First illustrations are in adverb clauses.

1. Time. You learn easily *when* you are interested.
2. Place. Cattle will graze *where* the grass is best.
3. Manner. The Indians live *as* their forefathers lived.
4. Comparison. New York has a better harbor *than* Baltimore has.
5. Degree. The greater a man is, the less he is disposed to show his greatness. — *Channing.* (Here the first *the* is an adverb modifying greater; the second *the* is a conjunctive adverb modifying the adverb less and connecting the two clauses. The principal clause is, The greater a man is.)

Conjunctive adverb in adjective clauses. Why, when, and where are the common forms, and they are frequently associated in this way; reason why, time when, place where.

1. Give a reason *why* you study grammar.
2. This is the time *when* you study grammar.
3. This is the place *where* you study grammar.
4. The child trusts because it finds no reason in itself *why* it should not. — *Holland.*
5. Some schools are places *where* laziness becomes habitual.
6. The place *whereto* he came was an abandoned mine.
7. This great world is the mirror *wherein* we are to behold ourselves. — *Montaigne.*
8. The play is the thing
   Wherein I'll catch the conscience of the king.
   — *Shakespeare.*

9. Not a soldier discharged his farewell shot
O'er the grave *where* our hero was buried.

10. Is patriotism a narrow affection for the spot *where* a man was born? — *Fisher Ames.*

III. Relative Pronoun

See illustrative uses in sections 418 and 419.

423. Distinctive uses of connectives illustrated. — Use in the sentence determines the specific classification of connectives. Take *as* for illustration.

1. Strong men wept *as* the procession passed. Conjunctive adverb of time.

2. Grammar is *as* easy *as* arithmetic is. The first *as* is an adverb of degree modifying the adjective easy; the second *as* is a conjunctive adverb of degree.

3. Your place has been filled, *as* you came too late. Conjunction.

4. There are such pupils *as* one could desire. Relative pronoun.

424. Synthetic drill on connectives. — Construct sentences to illustrate the following:

I. Conjunctions

1. Co-ordinate: and, but, or.
2. Expressing cause: as, since, because.
3. Condition: if, unless, except.
4. Concession: though, although.
5. Purpose: that, in order that.

II. Conjunctive Adverbs

1. Time: when, before, after.
2. Place: where, whence, whereto.
3. Degree: as-as, the-the.

4. Comparison: than, as.
5. Why, where, when, introducing adjective clauses.

III. Relative Pronouns

1. Who, whose, whom, which, that.

425. Fill blanks, tell kind of connective, and classify dependent clauses:

1. —— you have nothing to say, say nothing.
2. —— I admire his courage, I consider him cruel.
3. Do not go —— the sun has set.
4. Holmes wrote —— he amused others.
5. I am proud —— I am an American.
6. —— any one attempts to haul down the flag, shoot him on the spot. — *John A. Dix.*
7. We join ourselves to no party —— does not carry the flag and keep step to the music of the Union. — *Rufus Choate.*
8. There is no language or speech —— their voices are not heard.
9. He will neither come in —— go out.
10. I see no reason —— you should not succeed.
11. You cannot succeed —— you work.
12. The moon rose —— the sun had set.
13. —— he fails to repay me, I will trust him.
14. These are the pupils —— future will determine civic questions.

426. Exercises in false syntax. — These sentences illustrate many of the common errors in speaking and writing. Have pupils read a sentence, tell specifically what the incorrect use is, give reason, and then give the correct form.

1. It is me.
2. I done that.

3. I seen him.
4. This here one.
5. Do like I do.
6. I have got back.
7. Not as I know of.
8. I have saw him.
9. Who do you see?
10. I had ought to go.
11. See that there bird.
12. Can you learn me?
13. I had rather write.
14. He had laid down.
15. Set down and rest.
16. What are the news?
17. He was to Henry's.
18. Don't never do that.
19. They returned back.
20. It was her who called.
21. He must stay to home.
22. Did you see them men?
23. Either of the men are rich.
24. Henry and John is coming.
25. You hadn't ought to go.
26. Continue on in this way.
27. Who does this belong to?
28. He had near ten dollars.
29. I have a couple of dollars.
30. He died with consumption.
31. I guess I can do this work.
32. I only want five dollars.
33. This is the best of the two.
34. Many words they darken speech.
35. We had an awful nice time.

36. I expected to have seen him.
37. He had four brother-in-laws.
38. There is lots of them in school.
39. The two first men are strongest.
40. Let you and I study together.
41. He dropped down into the water.
42. They differ between one another.
43. Some one has broke my pencil.
44. It is funny how long he stays sick.
45. You are better than me in arithmetic.
46. I don't like these kind of sentences.
47. Wanted a room by a man ten feet by fifteen feet.
48. You are not as careful as you should be.
49. The general, as well as his soldiers, were taken.
50. There seems to be no good reasons for tardiness.
51. At the North and South Poles the latitude is ninety degrees.
52. He spoke his piece clear and distinct.
53. A lady wants to sell her piano as she is going abroad in a strong iron frame.
54. I went to New York, you know, and when I came back, you see, I entered school.
55. With a few simple words he proved the previous speaker to have been mistaken.
56. He denied but that he was opposed to the law.
57. San Francisco is the largest city of any city west of the Rocky Mountains.
58. The company which she had taken so much trouble to select were not pleased with each other.
59. The elephant and beaver's instinct approaches close to reason.
60. If any pupil does not understand, let them say so now.

CHAPTER XII

GEOGRAPHY

427. The old and the new. — In the widespread criticism of old ways of teaching, geography has received its full share of censure. Slavish following of the text-book, memorizing long lists of names, and the study of unrelated facts are among the faults mentioned. The new presentation of geography makes man the centre of interest by relating all the facts to the welfare of mankind. This is what is meant by saying that "geography should be invested with human interest"; and that "the aim in teaching geography should be to give the pupil knowledge of the earth as it ministers to human life."

Illustrations

428. The old way. — The old way of studying the rivers of the United States required a description of each river under the form "rises, flows, and empties." Today those three items are subordinate facts in the larger effort of finding what each river does to aid agriculture, manufactures, commerce, and the pleasures of life. Aside from the use of drainage, the student studies the correlated facts of science, literature, history, and geography until every important geographical fact becomes a related cause in the past, the present, and the future progress of humanity.

429. The new way. — "Once there was no geography of the Rocky Mountains, for example, except a study of their location and elevation and their representation on colored maps. Today the student studies its Yellowstone, its Salt Lake, its palisades, parks, and cañons, but he soon runs aground in the legitimate fields of geography, and finds himself encroaching upon the territory of geology or botany, zoölogy, chemistry, physics, or mineralogy. Even in an elementary discussion of the influences of these mountains upon the climate of the continent, many facts must go unexplained without the principles of natural philosophy. That geography of the Rocky Mountains is incomplete which does not include a typical and detailed study of its industries, of its mining, smelting, lumbering, herding, and its method of agriculture and irrigation. A study of the various peoples of the mountains may take the direction of sociology, economics, ethnology, and government. The geography of the Rocky Mountains thus approached, and only thus, may give a true insight into, and an ability to interpret, that part of the world." — Heeter, *Commercial and Industrial Geography*, *N. E. A. Report*, 1907, page 509.

430. Definitions of geography. —

1. Description of earth's surface.

2. Study of concrete environment. — Bagley, *Educative Process*, page 37.

3. Biological investigations of living matter; political and industrial. — Harris.

4. Science of present appearance of earth's surface; physical. — Parker, *Talks*, page 27.

5. Study of earth as home of occupations of man. — Dewey, *School and Society*.

6. Study of earth as home of man. — McMurry, *Special Method in Geography.*

431. Broader educational use. — This modern conception of the industrial value of geographical knowledge is proof enough that the study of geography is more than a mere memory process. Present methods of teaching employ observation, memory, imagination, reason, and judgment in every complete study of a topic.

An Eclectic View

432. The courses of study. — Several American cities have recently adopted courses of study which exemplify a kind of common agreement on matter and method. No other subject in the elementary schools is so near uniformity under our national ideal. One illustration of this excellence is seen in New York City. The general course of study for New York City was adopted by the Board of Education May 27, 1903; revised June 21, 1905, and June 11, 1907; and the syllabus in geography was adopted by the Board of Superintendents in October, 1905, and revised in July, 1907. This last revision embodies the consensus of opinion of the best thinkers on this subject, and so some parts of the suggestions on geography are taken verbatim, as in sections 433 to 436 inclusive.

433. Introductory note. — Geography has been defined as "the study of the earth as the home of man." How this physical environment aids or hinders the development of man, and what man has done to modify, adapt, and utilize his physical environment, constitute the subject-matter of geography. The human feature — man's achievements in industry, commerce, and political organization — should predominate in the

study. As Dr. Harris has stated the proposition, the pupil "must begin with the natural differences of climate and lands and waters and obstacles that separate peoples, and study the methods by which man strives to equalize or overcome these differences by industry and commerce, to unite all places and all people, and make it possible for each to share in the production of all."

The objects of teaching geography may be classified as practical, intellectual, and ethical.

434. Practical purposes.

1. There are many geographical facts, such, for example, as the location and characteristics of important cities, mountain systems, and large rivers, which it is a disgrace and a misfortune not to know. Every public school child must be made to know such matters so thoroughly that he will never forget them.

2. Maps and plans are now constantly used in newspapers and in business. The child must, therefore, be made to understand their conventional symbols and to become expert in referring to them and interpreting them.

3. The child, as a member of a great manufacturing and commercial community, should be familiar with the resources and productions, raw and manufactured, of his own country, and of all countries with which we have dealings; he should know the chief markets, home and foreign, for our goods; he should learn the quickest, safest, and cheapest trade routes; he should be able to form conceptions of the kind of goods which home and foreign customers require from New York. While it cannot be expected that a child's judgment on such matters will be highly trained, he should know how and where to find such information when he needs it.

4. Our current literature, magazines, and newspapers assume an intimate knowledge of geography on the part of the reader. School training in the subject should, therefore, result in the ability to determine quickly, by the use of an atlas, gazetteer, or other work of reference, the location and characteristics of places, the names of which are met with in reading or required in business. Special training along this line is required during the last three years of the course, under the heading, "Location of places associated with important current events."

435. Intellectual purposes.

1. Geography may be made to train the *observing powers*. As far as possible everything taught should be illustrated from what the child may see in this city. This statement holds good not merely of the introductory lessons in home geography, but of the lessons throughout the course. Representatives of the chief races of men, every conceivable product of man's skill and industry, every modern means of transportation and communication, may be observed in this city, while our parks and museums are full of objects of historic and contemporary interest. It is suggested that each pupil be furnished with a small blank book in which to record out of school the results of his observation.

2. It may be made to train the *imagination*. At every step the pupil is called upon to build up conceptions of objects unseen and places unvisited through images derived from things seen, from pictures, and from verbal descriptions.

3. Rightly taught, geography trains the *memory*. The great vice, however, of geography instruction is the learning by rote of lists of names, (rivers, cities, etc.),

or the descriptive matter in the text-book. To avoid this barren and wasteful process, the facts of geography should be linked by natural associations. "What association so strong," asks Professor Laurie, "as the association of all our knowledge of a subject with the familiar objects of our daily lives, out of which we have made the teaching of geography spring? What association so strong as the organic connection which this mode of teaching establishes in the mind?" Names of places, whenever possible, should be associated with important historical events and with literary allusions.

4. Geography should also be made, particularly during the last three years of the course, to train the *reasoning powers*. When you ask a child to classify the natural features of a country, rivers, for example, according to some common property, as navigability; or the products of a country, as necessaries and luxuries; and still more when you ask him to generalize after he has classified, as, for instance, to determine the status of a people after a classification of their products, you are training him to reason.

436. Ethical purposes. — The ethical purposes of the teaching of geography are to lead to the moral lesson that all men must work and that each man should so work that his labor will benefit not only himself but the whole community, and that what is true of individuals is equally true of nations. "There is probably," says Professor Laurie, "no one subject so prolific of matter for independent thought and judgment on the affairs of life, and the destiny and duty of man. By means of it, too, we not merely furnish moral material, so to speak, but we extend the sympathies of the pupil, and lay the foundation of that sentiment of humanity which is the

necessary counterpoise to narrow and parochial prejudices."

In order that these matters may be more fully understood, the pupils must also be led to consider the earth in relation to the sun, its forms, its motions, and such resultant phenomena as the seasons, air and ocean currents, and rains.

437. Col. Parker quoted. — The first steps in geography should give the child the means to imagine that which he cannot see. Begin with the forms around you; the close and careful study of the chains or ranges of hills, valleys, plains, coast-lines, springs, brooks, rivers, ponds, lakes, islands, and peninsulas. Study them as you do objects in botany or zoölogy. Take the children out into the fields and valleys; return to the schoolroom; let them describe orally what they have seen; then mould and draw it; and, finally, have them describe the objects they have seen by writing. Teach them distance by actual measurement; boundaries by fences, and other limitations; drainage by gutters, and the flow of water after a rain. Let them find a spring, and discover how the water comes out of the ground. Have them bring in different kinds of earth — gravel, sand, clay, and loam. I have not time to give you any regular order of subjects — if there be one. Begin with one object, study it carefully, then take another and combine the two, and so on. I wish to call your attention especially to the three great means of thought expression: first, the concrete expression; second, drawing; third, language. The first may be done by mouldings and obtained from an iron-foundry. Have pupils tell you what they have seen by moulding the form. Second, have them draw everything they see in relief and hori-

zontally. Third, describe what they have seen orally, and then in writing. Use these means continually in teaching geography. — *Talks on Pedagogics*, page 125.

438. Home geography. — No matter where the school may be located, the first lesson in geography should be an observation of the facts at hand. Schoolroom, school yard, district, town, country, etc., make a series in going from the known to the related unknown. But what facts should a child know as a basis for geography?

439. Fundamental facts. — A knowledge of geography implies a knowledge of location, direction, form, size, and distance. A further analysis might require space, time, proportion, and other elements, but our purpose is to ascertain useful essentials rather than to try to make a complete category.

440. Early lessons. — Nature study and object lessons are a preliminary preparation for geography. In this way pupils acquire the elementary knowledge of soil, climate, productions; animal, vegetable and mineral life; and the general needs of mankind. This concrete approach to technical geography invites the use of approved methods and devices, and so it is probable that the *plan* is made familiar as a means of getting a concept of forms. The word plan in this use means a representation of anything drawn on a plane. Thus the point of the pencil is represented by a dot; the pointer, by a straight line; the pane of glass, by a rectangle; the face of a cube, by a square; the sphere, by a circle. The top of the child's desk furnishes an easy plan. Drawn full size, the plan requires actual measurement; a smaller size calls for the use of proportion and scale. Other plans may include the room, one floor of the building, the yard, and a part of the district or the

city. Right here in this early work distinguish picture and plan or map. Show picture and plan side by side.

441. Points of compass. — The exercises 438 and 440 may be used in teaching the points of the compass. North, east, south, and west can be fixed in mind by positions of objects on each desk. Enlarge the application by indicating directions in room, yard, or district. Use sunrise and sunset as aids. Locate north star, face it, and then apply the old way of stretching arms, right toward the east and left toward the west. Mention use of shadows and blowing of smoke as means of determining directions. Study wall map and apply knowledge. Locate a place and have children point to neighboring parts and tell directions. For more practical application, have pupils walk toward certain designated places. This exercise gives a personal relation to the facts. Its use makes pupils realize that north is not always up nor is south always down.

442. Distance. — Actual measurements of familiar things must always be one way of acquiring the concept of distance. Time required in travelling, is another equivalent of distance, especially with city children. The average child will speak of the length of Brookyn Bridge as twenty minutes rather than a mile. Distance as an element of size in geography is likely to remain an imperfect estimate.

443. Maps. — The study of the schoolroom gives a larger conception of shape, size, location, cardinal directions, scale, and proportion. The intermediate points, northeast, southwest, etc., should be taught. The placing of pupils in the principal points in the room is a concrete way of sustaining interest. It gives reality to the exercise; and right here the pupils can begin to

use their constructive imaginations by making little journeys in the room. Name directions to and from which they travel. The map of the room requires another application of measurement according to a scale. Desk, library, and other large objects should be located on map, but the location of seats should be deferred. Too many items lead to confusion. This selection of important objects is the first act in the formation of the habit of observing the essentials in later map study.

The next step is simply a larger application of the ideas already gained. In cities, it may be a map of one floor of the school building; in rural schools, the yard is better because it puts pupils into contact with the realities of geography. The pupils' homes are still objective points of interest, but hills and valleys, woods and growing crops are also inviting forms of educative material related to the welfare of man. All these are interesting aids in fixing locations, applying directions, and training the pupils to image a map of all the points observed.

444. Models. — The exercises already suggested are means of training the observation. At the same time the memory is developed. When it is not possible to observe the actual forms of land and water, models and pictures are supplemental aids. Models may be made of clay, sand, putty, or paper. Clay and putty are serviceable for permanent illustrations. Moist sand is desirable because it can be used many times. Paper pulp is light and inexpensive, and it is easily colored to represent different elevations. The pulp is prepared by tearing paper into small pieces, soaking it, kneading it, and then draining off the water. It is easily worked into shape to represent land forms. Use glue or mucilage to fasten it to heavy paper or board.

To illustrate rivers, lakes, or other forms of water, build the model upon blue or green paper or upon a pane of glass. Then mould the land forms but leave paper or glass exposed to illustrate water.

445. Constructive imagination. — The use of observation as a process in elementary work in geography has already been shown. Likewise for the first uses of the memory in retaining geographical information. As soon as pupils are required to think of forms or conditions which they have not observed, the constructive imagination is brought into use. A familiar pond may be enlarged by the constructive imagination to make a lake; the neighboring hill can be increased in size till it becomes a mountain; the valley stretches to limits beyond the power of human vision, and it becomes a plain. All the facts observed in home geography are applied to locations in other parts of the earth; the streets, the houses, and the public buildings in the native village have to be transplanted and modified to make the image of a foreign city. Thus it is that in nearly every mental act in the broader study of geography the constructive imagination presents to the mind the images of things which can be thought although they are not actually observed. This power of the mind is also employed in constructing models, making maps, in getting the thought from oral or written descriptions, and in making commercial trips to the principal ports of the world.

446. Analytic and synthetic methods. — The analytic method of teaching geography begins with the globe as a whole. It divides the surface of the earth into land and water and then subdivides the surface into islands, peninsulas, continents, rivers, lakes, oceans, etc. The

advantages claimed for the analytic method are the following:

1. Whole to parts.
2. Early familiarity with the globe.
3. Better view of relative position, size, form, divisions of land and water.
4. The globe enables the teacher to explain causes of day and night, change of seasons, etc.

447. Synthetic method. — The synthetic method of teaching geography begins with the geography of the home and the schoolroom and then proceeds to the school yard, the neighborhood, and the larger political divisions. It begins with the island, peninsula, valley, hill, river, or lake, which the child can see, and then proceeds by use of the imagination to the other forms which the child cannot see. The advantages claimed for the synthetic method are the following:

1. Interest in familiar objects.
2. Known to related unknown.
3. From the near to the remote.
4. Concrete to abstract.
5. An inductive method.
6. It gives the pupil a fundamental geographical knowledge and enables him to pursue the study alone. In other words, it is a direct way to self-activity.

448. Both methods combined. — Both analytic and synthetic methods are used. The latter is used in beginning geography in 4A, the pupils making a map of the schoolroom and one floor of the school building as an introduction to the study of the map of the City of New York. Home geography covers location, nationalities and local history in such a way that the pupils become familiar with the industrial, social and civic rela-

tions. The analytic treatment of the earth and its subdivisions is also given in 4A, using the globe. Thus the advantages claimed for both methods are utilized.

449. Excursions. — Excursions to fields, parks, and museums, to docks and water fronts, to centres of local industry, manufacturing establishments, and sources of supply, and to historical buildings, monuments, and tablets are recommended. Constant appeal should be made to the individual observation and judgment of pupils. — *Introductory Note in Geography, New York City Course of Study.*

The mode of learning facts by means of excursions is a concrete approach to vivid ideas. A preliminary discussion in the classroom prepares the mind for immediate and active receptivity in the fields. The facts of local environment are learned so that pupils may begin early to adjust themselves to their environment.

A second value of such facts is the acquisition of types of knowledge. These types are employed by comparison and contrast in studying similar facts or conditions in other parts of the world. Remember that the excursion itself is not the type of knowledge; the type is what is learned. Thus the study of a gas plant is a type for the study of other gas plants; one bicycle factory furnishes data for a type of knowledge in that line.

A third value of information acquired on excursions is economy in the act of learning. The lesson is concrete; the conditions are interesting; the class is under social stimulus; exercise, circulation, and respiration favor good physical support for mental activity.

Fourth, the facts acquired do not admit adequate presentation within the scope of elementary text-books. Take, for instance, a canal. The topic is the construc-

tion and operation of a lock. A quarter of an hour in observing the passage of a boat from a lower level to a higher level will give an intensity of impression that is not within the possibility of schoolroom teaching.

Fifth, correlation of industries. Actual contact with the various unified forms of industry will tend to put the children into sympathy with the conditions requiring co-operative adaptation in later life.

450. McMurry on excursions. — A detailed treatment of excursions and types in teaching third and fourth grade geography is given in *Special Method in Geography*, by Charles A. McMurry. (The MacMillan Company.)

Committee of Ten Quoted

451. Order of treatment. — The *Report of the Committee of Ten*, page 211, suggests an order of treatment based on mental processes. (Quoted in sections 451 to 455 inclusive.) "Reduced to a sentence the scheme is: first, see; next, reproduce; then study the productions of others, and, meanwhile, ponder and reason on all.

452. Representative geography. — Immediately after the making of observations should come their reproduction in the form of descriptions, sketches, maps, models, etc. The instruction of the teacher falls short of its highest efficiency if the early work is merely observational and receptive. The great end of education is to create productive ability. One important form of this is representative production. Besides having value in itself, the description of features that have been seen and their representation by sketches, maps, or models reacts upon the observational work and induces a clearness, sharpness, and definiteness that it would not otherwise be likely to take. Not only this, but it leads the

scholars to realize what maps, descriptions, etc., really mean.

453. Derivative or descriptive geography. — When pupils have gained true and vivid basal ideas by observation and have, by reproducing these, acquired a realistic sense of the meaning of maps and an ability to read them, in the full and proper sense of the term, they are prepared to pass on to a formal study of descriptive geography. In this, the observational and representative work of others than themselves is made the basis of study. The pupils are not now studying the earth's surface but 'a description of the earth's surface.'

454. Rational geography. — It has already been urged that the pupils should be induced to observe changes and processes as well as the simple passive facts of geography, and that there should thereby be laid the foundation for an understanding of the origin, the development, and the future history of geographic features. This is the introduction of rational geography, as distinguished from the mere noting and memorizing of facts. This phase of the subject, which leads the pupils into the reason of things, should be assiduously cultivated, for it is the soul of the science. It should, however, be carefully adapted to the capabilities of the pupils, particularly in the earlier stages of the study. They should not be forced beyond their capacity to comprehend the nature of the agencies that have rendered geography what it is. On the other hand, there is an equal danger of underestimating the capacities of pupils to see into the reasons for natural operations.

It is not recommended that rational geography be disassociated from observational and descriptive geography, but rather, on the contrary, that it be intimately

connected with these and that it be introduced so as to give them life and significance.

455. Observational geography. — In the judgment of the Conference, observation should go before all other forms of geographical study and prepare the way for them; its object being (1) to develop the power and habit of geographic observation, (2) to give the pupils true and vivid basal ideas, and (3) to arouse a spirit of inquiry and a thirst for geographical knowledge. This work of observation should begin with those features that lie immediately about the pupils and so fall easily within the reach of their direct study and ready comprehension. In rural districts, the natural features of the surface will obviously form a large part of the study, while in cities, the artificial features must largely take the place of these. In the one instance, natural geography, as seen in the forms of the land, the hills, valleys, plains, meadows, divides, streams, lakes, etc., will predominate, while in the other artificial, or humanistic geography will receive leading attention, as streets, railways, wharves, harbors, parks, plots, wards, etc.; but something of both these groups of subjects may be found and utilized in both localities. Neither should be neglected, for the pupils need not only to acquire clear ideas of the things by which they are chiefly surrounded, but type ideas of the things which characterize other localities and of which they need to form correct ideas without being able to see them. Observation, however, should not be confined simply to the passive fixed features by which pupils are surrounded. They should observe the agencies that produce surface changes, such as winds, rains, floods, thawing, freezing, cultivation, etc. The temporary streams that follow heavy

rains represent on a small scale many of the natural processes by which surface features are produced. From these immediate agencies, the observations should extend to the phenomena of the weather and the climate, such as temperature, winds, clouds, seasons, etc. . . . As a step toward the study of the distribution of plants and animals, and an insight into their dependence upon temperature, soil, food, etc., the pupils should be encouraged to observe the differences of plants on uplands, lowlands, marshes, etc., and upon sandy, clayey, gravelly, or stony ground, and to note the habitual dispersal of animals and insects in the neighborhood, and also their relations to each other, as in forming or frequenting forests, prairies, meadows, etc. As a step toward the study of the human elements in geography, observations should be made upon the population and its distribution, upon home occupations and productions, upon local political boundaries, as wards, school districts, city or town limits, etc., and upon the location of cities, villages, railways, canals, etc.

456. Concentric circles. — The arrangement of subject-matter in any course of study may be made so that the elementary facts of a subject are treated as fast as pupils are able to master those facts. Then in a later grade the more difficult facts are presented after a review of the elementary facts already mastered. This process of enlarging the scope of knowledge as pupils pass from grade to grade has been termed the arrangement in concentric circles. Many of the new text-books in the various subjects are made according to this plan. The old method attempted to master all essential knowledge of any part of a subject before passing to another chapter which dealt with another phase of the same subject. It is

claimed that the plan of concentric circles is in harmony with the interest and the ability of pupils.

This arrangement in concentric circles, or cycles, is known as the spiral method in geography. This plan of arrangement is used in nearly all the modern courses of study, although there are some adverse criticisms of it. In teaching the circle of simpler facts, some teachers fail to give enough information, while others pass beyond the elementary circle into the fields of information which are supposed to be reserved for another grade. These two conditions are likely to make children show a lack of interest as soon as another teacher begins to review or enlarge the circle of information already covered.

457. Illustration of concentric arrangement. — The following outline for five grades illustrates the cycles in geography.

4A. Home geography, local history, the earth. Form and surface; the continents; the oceans; great islands and groups of islands; great seas, gulfs, and bays.

4B. The earth: motions, zones. Eastern and western hemispheres, world stories, duties of citizens and public officials.

5A. The earth: seasons, latitude, longitude. General study of North America and United States.

5B. United States: representative states in each group. New York and the City of New York.

6A. South America, Canada, Mexico, Central America, and West Indies. Location of places associated with current events.

6B. Europe. Location of places associated with current events.

7A. Review of United States and its dependencies. Places and current events.

7B. Asia, Africa, Australia, and Island Groups. Places and current events.

8A. Mathematical and physical geography. Places and current events.

8B. Review of political and commercial geography. Places and current events.

458. Causal relations. — In the study of geography it is possible to memorize all the important facts about topography, climate, and human progress, but that knowledge would not be considered satisfactory in content or method. Every part should be associated with cause and effect. Topography modifies climate and both topography and climate affect man. Man, in turn, converts many of the physical conditions to his own advantage. The tracing out of all these mutual conditions as causes and effects employs the reasoning powers in getting what is known as causal relations.

459. Causal series. — Recall the criticism of the old ways of teaching geography by making it a memory process. The explanation of causal relations already given is another way of showing that the modern teaching of geography appeals to the other powers of the mind. The processes required for reason and judgment are employed in all phases of the work from 4A through 8B. The arrangement of topics in such a way that the causal relations appear as a series gives rise to the term casual series. The following topics constitute a causal series: (1) Location, (2) resources, (3) industries and occupations, (4) products, (5) commerce, (6) chief cities, (7) social development. See latest outline suggested in Plan of Study for 1907, section 466.

460. Man and nature. — Thus the interpretation of causal relations in geography involves the reciprocal

relations of man and nature. We quote from an article on Commercial and Industrial Geography by Superintendent Heeter of St. Paul, *N. E. A. Report*, 1907, page 508.

" While climate and topography have operated singly and together in the distribution of life and both have played an important part, not only in the making of history, but in determining the customs and achievements of every people, yet man has not been a slave to geographical conditions. He has gone forth to modify, to rise above environment, to multiply, and to subdue the earth, and there is a human, as well as a natural, interest in all this new study.

'Tis true, man has populated the earth, the Northland and the Southland, from Scandinavia to Siberia, from Abyssinia to the islands of the sea, but wherever he has gone, he has clad himself to meet the conditions of climate; he has built to withstand the tests of season; he has labored for wholesome food; and has forced the earth to yield up more than her native stores. The very form and character of his effort, as revealed by the apparatus in organization of industry, show not only the process of adjustment to native environment, but a determination and a success in rising above all natural limitations. Thus the Esquimau labors and invents, but not the same as the nomad of the desert, the planter of the flood-plain, the ranchman of the foot-hills, or the lumberman of the camps. The great double, question, then, confronting the student of geography today is, first, what physical and climatic conditions have directly influenced the different peoples of the earth, their modes of life, and their activities? Second, what have these people in turn done reacting against their geographical environment?

Under the stimulus of man's inventive genius, along with the evolution of modern science and inventions, intercommunication has been made perfect, barriers have been broken down, regions once isolated have been connected, continents have been linked, the whole earth has become one vast neighborhood, and every man a neighbor. Here we see the interdependence of men, the East upon the West, the West upon the East, the North upon the South, and Europe upon America. Adverse conditions in one section affect all other sections. Civilized man everywhere is dependent upon all regions of the earth to contribute to his food, shelter, clothing, and culture; and a large part of civilized effort has been directed toward perfecting modes of travel, commerce, and intercommunication, until today streams of trade have opened into world-wide currents."

461. Types in geography. — A type in any study is a form of knowledge fixed in the mind. Such a form of knowledge becomes an apperceiving group for all other related knowledge. Thus in the study of geography it is possible to have the child master a characteristic mining section, or an agricultural section, or a manufacturing section. Then when he comes to study other portions of the globe situated within the same general boundaries, his first inference will be that the conditions in those respective mining, agricultural, and manufacturing sections are similar to the ones already studied. The analogy must be tested by finding a few conditions that mark a difference between the two sections. The advantages claimed for types as given by McMurry are the following:

1. Types are keys to larger areas of geographical knowledge.

2. Realities are studies.
3. Thoroughly interesting and instructive.
4. The study of causes and causal relations.
5. Basis of a series of comparisons.
6. From home outwards.
7. Direct path to whole groups and sequences.

Illustration of Type

462. Home city a type. — In 4A grade the pupils make a thorough study of New York City. Note how this kind of treatment could be applied to Boston, Chicago, San Francisco, or any other city.

HOME GEOGRAPHY. — A plan of the schoolroom as an introduction of the study of maps; sketch plan of the school block, showing the position of the school building and the location of the classroom; the directions, north, south, east, and west indicated; plans drawn without reference to scale. Topography of the City of New York and vicinity; location of city with reference to the states of New York and New Jersey; division of city into boroughs and names of boroughs; direction of each borough from home borough; boundaries of the home borough and of Manhattan; land and water forms of the neighborhood; the harbor and water fronts. Location of main avenues and streets of home borough; names and locations of local bridges, tunnels, parks, and other important points of interest, with their attractions and the means of reaching them .

POPULATION. — Brief reference to nationalities composing it; occupations of the people illustrated by reference to neighboring farms, factories, shops, and to street and river traffic; transportation of people from the home borough to the business sections.

LOCAL HISTORY. — Stories connected with the history of New York told or read by the teacher or by the class; stories illustrated by reference to places and monuments of historic interest; biographical stories illustrating some of the great historic periods, as the settlement of Manhattan and neighboring territory; Dutch occupation; the coming of the English; struggles with the French and with the Indians; New York during the Revolution. Department of the city as a manufacturing and commercial centre, *e.g.*, Fulton's steamboat; the opening of the Erie Canal; the introduction of the telegraph; the laying of the Atlantic cable; the Brooklyn Bridge; consolidation; the Greater New York; the opening of the subway.

Stories of distinguished citizens of the City of New York, such as Peter Stuyvesant, DeWitt Clinton, and Peter Cooper.

GOOD CITIZENSHIP. — Fire Department. Fire alarms; engine houses; duties of firemen; instances of heroism.

Duty of Citizens. Care in the use of matches, kerosene, gas, benzine, and other explosives or combustibles; care in regard to fireworks, bonfires, and rubbish; duty of keeping fire-escapes clear of encumbrances; fire-drills; means of egress from buildings; behavior at panics.

Police Department. Enforcement of law; maintenance of order; control of crowds; protection of life and property; detection and prevention of crime; arrest of criminals; traffic regulation; instances of heroism.

Duty of Citizens. Respect for police authority; appeal in case of danger; rendering assistance in maintaining order; conduct in the streets; ball-playing and stone-throwing — why forbidden; protection of city

property. — From *Syllabus, Revised Course of Study,* 1905.

463. Comparison. — The study of geography by means of causal series, topics, etc., requires the constant use of comparison and contrast. But even aside from these specific methods involving the causes, many modern geographies present comparative tables for visualization. Some use dark lines of varying lengths to indicate the quantity of products. Others approach nearer the objective reality by presenting bags of different sizes to indicate the quantity of grains produced; barrels are used for wines, liquors, and other liquids. These tables whatever they may be, are simply another way of impressing geographical facts through multiple sense instruction. The memory alone is not required to carry the lessons of comparison.

Illustration of Comparison

NORTH AMERICA

1. North America is an irregular triangle.
2. On its west coast there is a high range of volcanic mountains.
3. Parallel with the east coast runs a lower range.
4. The middle of the continent is occupied by a vast plain, from the Arctic Ocean to the Gulf of Mexico.
5. The St. Lawrence flows from west to east; the Mississippi from north to south.

SOUTH AMERICA

1. South America is a regular triangle.
2. On its west coast there is a high range which contains many volcanoes.
3. Parallel with the east coast runs a secondary range.

4. The middle of the continent is occupied by a vast plain from the Caribbean Sea to the La Plata.

5. The Amazon flows from west to east; the La Plata from north to south.

This arrangement of facts is taken from DeGraff's *School Room Guide*, page 286.

How to Study

464. A plan suggested. — It is a relief to a faithful teacher to get a plan that can be used without general revision. This does not mean that rigidity is welcomed as a characteristic in place of flexibility, but it does mean that the practical educator welcomes any suggestion based upon successful classroom experience. The following six sections embody the recommendations by the Board of Superintendents in New York City in 1907, but the suggestions apply in New Orleans and Seattle as well as in New York.

465. Continents as wholes. — In studying the continents as wholes, attention should be directed to their comparative sizes (North America being taken as the unit), relative positions, their general contour, their great mountain systems, their great rivers, their large seas, gulfs, and bays, and their important neighboring islands. Then should follow the main political divisions and the positions of important cities.

466. Plan for studying a country. — In studying a country the following series of topics, as far as they may be applicable to the country under consideration and in the grade in which the lesson may be given, is suggested:

1. Location as determined by latitude and longitude and with relation to surrounding countries and waters.

Pupils should never be told the latitude and the longi-

tude nor required to memorize them, but should be trained to determine them by the inspection of a map.

2. Comparative size and shape.

The area of the State of New York (about 50,000 square miles) may be taken as the unit with which the areas of all countries shall be compared. The comparative size should never be told, but should be made a matter of calculation on the part of the pupil.

3. Mountain systems and important ranges; slopes and plains.

4. River systems and important rivers.

5. Important cities, their location, and their comparative population.

The population of the City of New York, four millions in round numbers, may be taken as the unit of comparison. When learning about a city, the reason for which it is celebrated should be brought out.

6. Climate, industries, products, and areas of production.

7. Form of government and general condition of the people as to education and ways of living.

Under the head of "Ways of Living" should be included housing, food, clothing, occupations, and use of animals.

8. Exports and imports, trade, particularly with the United States.

467. The recitation. — Most of the work in geography should be done in the classroom. Very little, if any, study at home is necessary. The lesson should generally begin with a study of a globe or a map. This should be followed or accompanied by the reading pertinent selections from the text-book or supplementary reader. The selections should be read aloud in class, and pupils

should be expected to answer questions after a single reading. Then some time should be spent in copying the map roughly from the book or from the wall, indicating such phases of the subject as have been studied. The next lesson should consist largely in questioning the pupils with the map before them and in requiring them to make rapid sketches of maps from memory. This exercise is the best method of fixing geographical knowledge and of showing the pupil how accurate or inaccurate his knowledge is. It is, moreover, the easiest way to teach much of this subject, as well as the easiest way to test the definiteness with which the subject has been learned. Care should be taken to see that these maps are only sketches and that time is not wasted on the unnecessary elaboration of details. Neither tracing nor construction lines should be used. Sand or clay modelling may be used in the early grades to give a conception of the surface of a continent or a country.

468. Use of pictures. — A valuable aid to instruction in geography is a picture. The only true conceptions of certain elements of geographical knowledge are obtained by travel and observation. But travel and observation for children are restricted within very narrow limits, and the best substitute is the picture. One picture is often worth volumes of verbal description, and at the present time there is scarcely any place or any feature of life or human activity of which a picture is not easily obtainable. Pictures are useful, however, only when children are trained not only to see and name the objects they contain, but to draw conclusions from them regarding the character of vegetation, the habitat and habits of animals, the ways of living and occupations of men, and other topics involved in the teaching of geography.

469. Outlines by pupils. — In the higher grades, pupils should be exercised in making synoptic outlines of topics treated in the text-book.

470. Aids. — Globe; outline, commercial, United States geographical survey, topographic and census maps; weather charts, pictures, photographs, lantern slides, and other illustrative material; collections of minerals, rock, soils, seeds, raw and manufactured material; text-books, books of reference on geography, history, biography, travel, natural history; magazine articles, newspaper clippings, almanacs of the New York dailies, railroad and steamboat guides, and official reports.

471. Dr. Maxwell on geography. — In September, 1907, Dr. Maxwell delivered an address before the principals of New York City. Sections 472 and 473 give the substance of his remarks on the revised syllabus in geography. See *School Work*, November, 1907, for an excellent abstract of the whole address.

472. Suggestions to principals.

1. That you read and discuss with your teachers the Introductory Note, which explains the organizing principle of the course and make suggestions as to method.

2. That you should take up lessons with your teachers as they will be expected to take them up with their pupils. These things require special attention to the following details:

(*a*) How to use a globe. See section 484.

(*b*) How to use a map. See section 502.

(*c*) How to study the text of the geography. See section 504.

(*d*) How to study a picture. Following plan suggested: Select a picture, see the items it contains, draw con-

clusions as to character of vegetation, occupations of men, ways of living, etc.

473. Results that are essential.

1. In learning about a place, a pupil should be able instantly to point to it on (*a*) a map with names, (*b*) map without names, (*c*) place it on a map rapidly sketched by children.

2. Tell why it is distinguished.

3. To make rapid computations as to relative size; continents with North America; countries with New York State; cities with New York.

4. To tell the latitude and longitude of a place from inspection of a map; and to locate a place, the latitude and longitude being given.

5. To make a synoptic outline of a given portion of the text. To meet criticism, I would suggest that both teachers and children should be required when mentioning any city in the United States to mention along with it the state in which it is located.

Suggestions for Devices

Some of these have already been mentioned, but we present them all under this heading so that the teacher may view the topics as a whole.

474. Concrete aids. — Moulding-board, globe, maps. See section 470.

475. Outline maps. — The time required for elaborate work in making the outlines of various states or countries is no longer considered useful in the study of geography. Outline maps may be secured from publishers and then the filling in becomes a valuable act of learning. Only the most important points deserve location on the maps.

The use of such map-making is simply one means of impressing through visualization and motor activity.

476. Product maps. — Product maps to illustrate resources. Concrete interest is attached to this kind of work as long as pupils are encouraged to place actual resources such as grains, minerals, kinds of trees, etc., on the map.

477. Scrap-book. — Have a bulletin or scrap-book for interesting articles brought by the children. The latter is recommended for permanent use. The teacher may find it necessary to reject some of the material selected by the children, but after a little experience the children will themselves be able to select what is worth preserving. Such a book becomes a permanent source of interest and information for succeeding classes.

478. Pupils as examiners. — Have pupils prepare suitable review questions at home. The abuse of this practice seems to be the only valid objection to this kind of constructive work. All the general acts in the school are tending toward habituation of a desired kind, and so there seems to be no good reason why pupils should be denied the right to take an active part in making the questions for review or for examination. The teacher's supervision is needed at all times, but that is no reason for rejecting all the work of this kind. A thorough justification may be found in a little actual experience.

479. Class discussion. — Assign topics for discussion by individuals. Limit the number so that the whole recitation need not be given to this kind of training. A few topics intelligently discussed will give variety to the exercise and also stimulate a wholesome interest in this kind of original research. Do not permit pupils to hold

notes while speaking; encourage them to remember as much as they can. Have the pupil who is speaking face the class.

480. Debates. — Have debates in grammar grades. These debates serve as a valuable kind of review. The pupils are required to select the essential facts, to weigh them in comparison with other facts, and then to use their reasoning powers in defending what they hold to be the facts of most importance. The following subjects for debate are suggested: Germany vs. United States; Limited Monarchy vs. Republic; Eastern United States vs. Western United States, taking the Mississippi River as a dividing line; Railroads vs. Steamships in the Development of Commercial Prosperity.

481. Commercial trips. — These trips are journeys from one port to another. Their purpose is general review. Pupils must name the ports, the steamship lines connecting, the cargo, the cities passed, the status of respective nations, the favorable or unfavorable climatic condition, ocean currents, return cargo, etc. Encourage pupils to sketch outline map to indicate the journeys made.

482. Geographical cards. — Many excellent series of geographical cards are issued by the various publishing houses. Some of these cards are intended only for review, while others furnish interesting information of literary, historic, and scientific value. For personal use, teachers can make such cards covering the specific work of their own grade.

483. Competition. — The kind of interest sustained by spelling matches and other competitive drills can likewise be applied in review in geography. An interesting application of this kind of drill is the assigning of

each child to one country in Europe, for example, and then asking him to be ready to present a complete defense of all the advantages of his country. The blackboard may be divided into sections so that each child may write a list of the important points in his defence.

484. The globe an essential. — Every class in geography should have a globe. Better yet if every pupil can have one during certain recitation periods and study periods. No child can learn all his geography by personal study of the earth itself, and so a globe should be made the most useful objective aid in all stages of the work in geography. Expensive globes are not necessary; in fact, complex and elaborate representations are confusing. A large globe can be made of clay, paper, or wood. Then paint the surface black and observe the advantage and delight in using crayon to illustrate the point of the early lessons in geography.

485. Uses of the globe. — Following are some of the specific uses of the globe in teaching:

1. Shape of the earth. The earth is an oblate spheroid. Then show the flattened surface at the poles. To carry the suggestion further, illustrate the flattening process by whirling a ball of moist dough on a wire or rod as axis.

2. Axis, poles, equator.

3. Rotation of earth. This will give foundation for later teaching of causes of day and night.

4. Revolution of earth. This will lead to causes of change of seasons.

5. Inclination of axis, zones, ecliptic, latitude, longitude, meridians, and parallels.

6. Distribution of land and water. Draw line around globe and observe which hemisphere has the more land.

7. Relative position of continents, countries, oceans, seas, etc.

8. Relief globe for illustrating surface.

9. Commercial routes to show the world's highways of commerce.

10. Use the globe in every development lesson to remedy defective ideas arising from studying a flat map.

486. The shape of the earth. — It is a difficult matter for pupils to understand all the facts used to prove that the earth is a sphere, but this difficulty is not a valid reason for dropping that work altogether. Pupils can understand some of the proofs; later in school life more proofs will seem clear; and during all the geography work, the pupils will be making useful inferences because they have faith in the conclusion. This topic is a valuable one because it invites thought all through life.

Lesson Outline on Shape of Earth

I. AIM. To prove that the earth is a sphere.

II. PREPARATION. The very announcement of the aim arouses curiosity. Additional interest may be awakened by having a cube, a cardboard disc, a wire hoop, a large globe, and a small globe for each pupil.

III. PRESENTATION. The proofs involve personal experience and derived information.

1. Horizon is always a circle.

This proof is a matter of observation. It is true for all locations. Use wire hoop to illustrate. Take any point within hoop, keep hoop in the plane of vision, and the limiting line of vision is always circular.

2. When ships are approaching, masts are seen first,

then the lower part of the masts, and finally the whole ship.

This is likewise a matter of actual observation. Illustrate by moving objects on the globe.

3. New stars come into sight as we reach new latitude.

This is information from the experience of others. Show that this change in the sky may be due to the curved surface of the earth. Use pointer held against object moved on globe and observe arc described by end of pointer.

N.B. These three proofs simply indicate that the earth has a curved surface.

4. The earth has been circumnavigated.

This is a fact in history. Recall Magellan's voyage from Spain across the Atlantic, through the Straits of Magellan, over the Pacific to India, around the Cape of Good Hope, and thence back to Spain. That voyage in 1519 and 1520 was the first complete circuit of the globe. Show commercial routes around the world. Show by cardboard disc that the circumference is a way leading back to any starting point; but a passage over the edge of the plane surface of the card would not lead back. Recall fear of sailors on first voyage of Columbus. They thought they would drop off the flat surface west of Spain and never be able to return.

5. Earth's shadow on the moon in an eclipse is always a circle or part of a circle. None but a spherical body can cast a circular shadow in any position.

Illustrate this by holding cube in the sun. Likewise with disc, pencil, pointer, book, etc. Observe shadow of pupil. The shape of the shadow is like the shape of the body casting the shadow. Briefly explain eclipse and show pictures of eclipses.

6. Analogy. All the other planets are seen to be spherical, and it is not probable that the earth is an exception.

This fact about other planets is verified by astronomers. Use of powerful telescopes is an interesting topic.

Note. — These are proofs that the earth is a sphere. The following proofs are intended to demonstrate the flattening at the poles; in other words, the earth is an oblate spheroid. Proofs 8, 9, 10 should not be given in elementary work in geography.

7. It is a law of all rotating bodies that they rotate upon their shortest diameter. If a spherical body in a fluid state be rotated, its axis of rotation will become its shortest diameter.

8. By actual measurement of the arcs of meridians, it is found that a degree increases in length towards the poles. This shows that the arcs near the poles are arcs of larger circles.

9. A pendulum vibrates more rapidly near the poles than at the equator. This is due to greater force of gravity.

10. Bodies increase in weight when moved from the equator to the polar regions. This is partly due to gravity, as in 9.

IV. Conclusion. The earth is an oblate spheroid. Its polar diameter is 26.48 miles shorter than its equatorial diameter.

Climate

487. Extension of the term. — The comprehensive use of the word climate requires a study of temperature, moisture, and all the modifying conditions of each. Temperature embraces the variations of heat and cold;

weather relates to daily temperature; climate means an average of weather conditions during an extended period. Moisture is water in any of its forms.

488. Conditions affecting climate. — The conditions affecting climate can seldom be considered alone; they modify one another. Younger pupils cannot understand all of the facts at first, but later study will utilize what is understood in the early lessons. These modifying conditions are often studied in relation to causes and effects.

1. Latitude. Climate becomes colder as distance increases north or south from the equator. The region of the equator receives the vertical rays of the sun; the regions north or south receive heat from oblique rays; the polar regions are deprived of heat and light for certain periods. This difference in vertical and oblique rays of the sun is due to the inclination of the earth's axis. The earth's radiation of the heat received is the fundamental condition to be considered here.

2. Altitude. The general rule is that cold increases with altitude. Three hundred feet make a difference of one degree. Rapid radiation of heat is the principal cause.

3. Proximity to the sea. Effect is toward uniform climate; cooler in summer, warmer in winter. The sea absorbs heat and radiates heat more slowly than the land. Hence, cool breezes from the sea in summer, warm breezes in winter.

4. Prevailing winds. Climate is modified by heat, cold, and moisture distributed by winds. Sea breezes carry much moisture; land breezes are dry winds.

5. Position and direction of highlands. Highlands modify climate by shutting off hot or cold winds; by

condensing moisture till it falls as rain; and by intercepting moisture-bearing winds.

6. Slope of country. Note how slope may favor climate under each of the five conditions already mentioned.

7. Nature of the surface. Forests equalize temperature and prevent droughts and floods. Deserts and sandy soils radiate heat rapidly; clay soils retain heat and moisture. Large areas of cultivated land absorb and radiate heat more rapidly than grazing lands. Bogs, marshes, and other lowlands tend to cool the air and cause fogs. Rocky surfaces heat and cool quickly.

8. Ocean currents. See Gulf Stream, Japan Current.

Illustrations of Climatic Influences

1. Western Alaska. Inference from latitude and altitude, cold; but proximity to sea, warm winds, and westerly slope favor mildness of climate.

2. Newfoundland same latitude as Ireland. Newfoundland cold by latitude, by Arctic current, by prevailing winds; Ireland has warm climate on account of Gulf Stream, winds, nature of surface.

3. The great deserts of Utah and Nevada are caused by the position and direction of the Sierras; moisture shut off and precipitated.

489. Forms of moisture. — Since moisture has so much to do with climate, it is necessary to consider the forms of moisture, their causes, and a particular explanation of rain.

1. Water vapor is a name given to moisture in an invisible form. Water which passes into the air by evaporation may be said to exist as water vapor.

2. Dew is one form of condensed vapor. If air con-

taining water vapor be cooled, the vapor will approach saturation, since the lower the temperature, the less the capacity for water vapor. On clear, calm nights the soil and vegetation radiate heat; the surrounding air becomes cooler; hence, vapor is condensed into small drops of water. The temperature at which condensation occurs is the dew-point.

3. Frost is frozen dew. Frost is formed when the dew-point is below 32 degrees Fahrenheit.

4. Fog. A visible mass of vapor on or near the ground is fog. Condensation is caused by the meeting of warm air and cool air. Thus the Newfoundland fog is caused by the warm air from the Gulf Stream meeting the cool air from the Arctic Current.

5. Clouds are visible masses of vapor floating in the air.

6. Mist is vapor falling in very small drops.

7. Rain is condensed moisture which falls when it becomes heavier than the atmosphere.

8. Hail is frozen rain.

9. Snow is frozen vapor.

10. Glaciers are rivers of ice.

11. Icebergs are portions of glaciers broken off and floating in the ocean.

490. Rain. — The four processes requiring explanation are evaporation, condensation, saturation, precipitation.

I. EVAPORATION. Familiar facts from observation.

1. Steam is condensed vapor coming from heated water.

2. Heat from the sun or from other sources turns liquids into water vapor, and then the water vapor rises in the air.

3. Water evaporates from clothes hung on a line.

4. Ink evaporates from wells.

5. Hands become chapped in spring because winds cause rapid evaporation.

6. Some ponds and brooks dry up in the summer.

7. Place dish of water in the sun and notice the effect.

8. Roads, sidewalks, and porches dry rapidly after a rain. Sun and wind hasten evaporation.

9. During hot afternoons in summer, the sun can be seen "drawing water"; *i.e.*, actual evaporation can be observed.

10. Definition. The process of moisture passing into water vapor, under the action of heat, is evaporation.

II. CONDENSATION.

1. Steam is not strictly water vapor since steam is visible. Water vapor, partially condensed by contact with cool air, is steam; and further condensation into water can be produced by having the steam come into contact with cold glass, slate, or other surface.

2. Moisture from the breath condenses on cool window panes.

3. Moisture condenses on the outside of a pitcher of water.

4. When pupils say they see their breath on a cold day, they see only the condensation of the moisture in their breath.

5. Definition. The process of water vapor or other forms of moisture passing into water, under the action of cold, is condensation.

III. SATURATION. Condensation of moisture in the atmosphere is caused by the cool surfaces of forests, hills, mountains, or by cool currents of air. Saturation

denotes simply the extent of condensation; it is all the moisture that the atmosphere can hold.

IV. PRECIPITATION. When saturation causes the moisture to become heavier than the air, the moisture falls as rain. This condition is called precipitation.

Summary for Application

1. Heat of sun converts water into water vapor. The greater the heat, the greater the evaporation.

2. Hot air can hold more water vapor than cold air.

3. When hot air containing water vapor becomes cooler the vapor condenses into clouds.

4. The clouds become saturated by the uniting of the particles of water, and then rain falls as soon as the weight is more than the air can sustain.

5. Rainfall is constant in a belt about five degrees wide near equator; periodic, north and south of the constant belt; variable, beyond the limits of the periodic belts.

6. Rains purify the air, modify climate, clean the surface of the earth, and help sustain all animal and vegetable life.

7. Notice the circulation of water: Rains supply springs, brooks, rivers, and all other sources of moisture; springs, brooks, and rivers unite to supply larger bodies of water; evaporation furnishes moisture in the form of water vapor for the air; water vapor condenses into clouds, particles unite and fall as rain. Think how this circulation is a natural way of sustaining the conditions required for agriculture, manufactures, commerce, and the leisure joys of life.

491. Glaciers. — This lesson need not be difficult if teachers will distinguish known and unknown.

I. PREPARATION. Recall hill, mountain, snow-capped summit of mountains; the melting, moving, and falling of snow on roofs, hills, and known mountains; successive thawing, snowing, and freezing on skating ponds; the familiar processes of wetting and packing snow in making houses, forts, snow-men.

II. PRESENTATION. Most of the facts are familiar. Larger applications are required.

1. Formation. Heavy snowfall on mountains during long winters. Summers too short to melt all the snow. Year after year snowing, thawing, melting, packing, and freezing continue. Thus the immense mass of snow and ice is formed into a glacier.

2. Movement. The slope of the mountain, the thawing, and the weight of the glacier will tend to cause a movement. Amount, one foot or more in a day. The top of the glacier moves faster than the bottom, the centre faster than the sides. Why? Tall, narrow glaciers move more rapidly than broad ones. Why?

3. Action of the glaciers. Huge rocks are torn away by the sides and bottom of the glaciers. Some of these rocks are crushed and distributed as soil, while others, badly scratched, are left in the pathway of the glacier. Such rocks are found on Long Island and in many parts of New England and New York .

4. Norway, Sweden, Switzerland, and Alaska are the homes of glaciers. The western coast of Norway is a series of beautiful fiords caused by glacial action.

III. DRILL. Whether named as application or continued presentation, this lesson is made more vivid by the following.

1. Pictures of glaciers.
2. Pictures of fiords.

3. Stereopticon views.

4. Magazine articles on life in the Alps.

5. Blackboard drawings. This subject is adapted to crayon illustration.

6. Geography readers and other correlated material.

7. Allied topics for collateral reading or for future lessons: Crevasses and moraines; the Ice Age in North America; icebergs.

492. Icebergs. — See lesson on glaciers. Icebergs are parts of glaciers. When the forward part of a glacier moves into the ocean, the force of the water lifts up the submerged part and breaks it off. This detached mass of ice then floats away as an iceberg. Ice is only a little lighter than water, and so only one-eighth of the iceberg remains above the surface of the water. The course of icebergs is directed by winds and ocean currents. Icebergs cool the temperature, cause fogs, and endanger navigation.

493. The seasons. — Pupils living in the temperate zones are familiar with spring, summer, autumn, and winter, but many pupils never fully understand summer and winter in the frigid zones and wet and dry seasons in the torrid zones. A season seems to stand for fixed temperature within definite zone boundaries. But as climate is the result of many modified causes, so the seasons yield to local conditions as we pass from zone to zone.

Facts for Lesson

1. The sun illumines but half the earth at once.

2. The earth revolves around the sun once in 365 days.

3. The earth's axis is inclined $23\frac{1}{2}°$ to the plane of its orbit.

4. The earth's axis always points in the same direction. The north pole points toward the north star.

5. Temperature depends upon the direction, duration, and distance of the sun's rays.

Inferences

Different parts of the earth's surface will receive different degrees of heat during the year. These differences may be stated in describing each of the seasons. See geography or drawings.

Description of Seasons

1. Spring. On the 20th of March the sun's rays are vertical at the equator; the circle of illumination intersects the poles; days and nights are equal everywhere, and heat is increasing in the northern hemisphere. This is the vernal equinox and the season is called spring.

2. Summer. On the 21st of June the sun's rays are vertical at the Tropic of Cancer; the circle of illumination extends $23\frac{1}{2}°$ beyond the north pole and falls short $23\frac{1}{2}°$ of the south pole; days and nights are longest in the northern hemisphere and shortest in the southern; heat is greatest in the northern hemisphere. This is the summer solstice and the season is summer.

3. Autumn. On the 22d of September the sun's rays are again vertical at the equator; the circle of illumination intersects the poles; days and nights are equal as on March 20; heat is decreasing in the northern hemisphere and increasing in the southern hemisphere. This is the autumnal equinox and the season is autumn.

4. Winter. On the 21st of December the sun's rays are vertical at the Tropic of Capricorn; the circle of illumination extends $23\frac{1}{2}°$ beyond the south pole and falls

short $23\frac{1}{2}°$ of the north pole; days are longest in the southern hemisphere and shortest in the northern; heat is greatest in the southern hemisphere. This is the winter solstice and the season is winter.

494. Zones. — Divisions of the earth's surface, corresponding to the amount of heat received and to the varying length of days and nights, are zones.

The lesson on the seasons gives the essential facts used in this lesson. This is simply a classification of those facts.

1. Torrid Zone lies between Tropics of Cancer and Capricorn. 47° or 3250 miles wide. Torrid means hot; this zone is the hottest portion of the earth. Days and nights nearly equal. Two seasons, wet and dry.

2. North Temperate Zone lies between Tropic of Cancer and the Arctic Circle. 43° or 3000 miles wide. Days and nights vary in length. Temperature varies; four seasons.

3. North Frigid Zone is north of the Arctic Circle. Width from Arctic Circle to north pole $23\frac{1}{2}°$ or 1625 miles; modern texts speak of the widths as 47°. Oblique rays of the sun part of the year. Days vary in length from twenty-four hours to six months. Two seasons, summer and winter.

4. South Temperate Zone is bounded by Tropic of Capricorn and Antarctic Circle. 43° wide. Four seasons opposite in time to North Temperate Zone.

5. South Frigid Zone. Size similar to North Frigid. Days and seasons opposite to North Frigid.

495. Isotherms. — Isotherms or isothermal lines are lines drawn upon a map or globe connecting all places having the same average temperature. Thus the

isotherm of 50° Fahrenheit passes through New York at 40° latitude and London at 50° latitude, making a dip of 10° in latitude. The true climatic zones do not correspond to the astronomical zones already discussed. The Torrid Zone is bounded by 70° F.; the Temperate, by 70° F. and 32° F.; the Frigid is below 32° F.

It is interesting to have the class follow a few isotherms around the earth and ascertain the causes for variation in latitude. Such an exercise will apply the facts under causes of climate.

Latitude and Longitude

496. — A lesson outlined. — This topic is so important that it seems prudent to suggest material for class work or examinations.

I. AIM. To understand latitude and longitude as means of locating places on the earth.

II. PREPARATION. Conversational exercise about familiar ways of locating things. Numbers for rooms, coat hooks, houses; aisles and rows of seats in the schoolroom; avenues and streets in the city. Show plan of regular section of a city where streets and avenues are at right angles. None of these ways adapted to earth as a whole; hence, necessity for another way.

III. PRESENTATION. Have circular disc, blank globe, maps, and mapped globe. Draw axis and equator on circular disc and blank globe. These give starting points for measuring.

1. The name of the equator is known. Measure north and south in inches. Show impractical use of such standards as inch, rod, or mile. Tell that the degree is the unit and that every circle contains 360°. This number was chosen because it is divisible

by all numbers from 1 to 12 except 7 and 11. These facts must be accepted; they do not admit development.

2. For latitude, tell that the equator is starting point for measurement north or south. Hence, places on the equator have no latitude; they are marked 0°. Now draw a circle passing through the poles; elicit that the north pole is a terminus in measuring north latitude, that the south pole is a terminus for south latitude; that the distance from the equator to either pole is one-fourth of the whole circle, or 90°; that the limits of latitude are 0° and 90°.

3. Parallels. Lines can be drawn parallel to the equator for convenience in indicating latitude. Call such lines parallels. Why?

4. Definition. The distance in degrees north or south of the equator is latitude.

5. For longitude, another starting point evidently is required. Tell pupils that the meridian passing through Greenwich, England, is the Prime Meridian. Prime means first; meridian means midday because all places on it have midday at the same time.

6. Draw Prime Meridian on black globe or indicate it on mapped globe. Two kinds of longitude, east and west. Have two pupils move objects from Prime Meridian east and west around the equator and thus observe that the maximum east or west longitude is one-half way around the earth, or 180°.

7. Meridians. Lines are necessary for indicating longitude; hence, the meridians.

8. Varying length of degrees of longitude. Observe meridians on globe and maps; mark meridians and cut sections from apple, watermelon, or other spherical forms.

Make pupils see that greatest length of a degree of longitude is on the equator; at the poles, 0°.

9. Definition. Distance in degrees east or west from the Prime Meridian is longitude.

IV. APPLICATIONS.

1. Practice in reading latitude and longitude at top and bottom of maps. Here explain that meridian of Washington is also used.

2. Find actual latitude and longitude of specified cities and countries.

3. Give latitude and longitude of certain places and have pupils find places.

4. Location of ships at sea. All ships have chronometers showing accurate time at Greenwich. For instance, suppose the sun indicates 10 A.M. when the chronometer indicates 3 P.M. Since any spot on the earth's surface passes through 360° in 24 hours, each hour is equivalent to 15°. The difference in time between chronometer and sun is 5 hours, or the equivalent of 75°. Hence, the ship is in 75° west longitude. The longitude is west because the time by the sun is earlier than the time by the chronometer. Reverse the facts and the longitude would be 75° east.

497. International Date Line. — If a man starts westward from London to travel around the world, he must set his watch back one hour for every 15° passed over if he wishes to have the correct local time. This would require twenty-four changes during the journey around the world, and thus he will lose twenty-four hours or a whole day.

If he starts eastward from London, he would set his watch ahead twenty-four times, and thus he would gain a day.

To overcome such differences, the nations have agreed upon a place where time shall be changed. That place is the 180th meridian east and west from Greenwich. Suppose the two men start from Greenwich near London, one going eastward and the other westward. The one travelling eastward will find the time twelve hours later than when he started, while the one travelling westward will find the time twelve hours earlier. So the latter in crossing the line on Wednesday must call the day Thursday; while the one travelling eastward in crossing the line on Wednesday must call the day Tuesday.

498. Standard time. — The railroads of the United States have agreed upon scheduled places for changing time. Following are the divisions:

75th meridian.	Eastern time.
90th meridian.	Central time.
105th meridian.	Mountain time.
120th meridian.	Pacific time.

It is evident that the difference in time between any two of these divisions is one hour.

499. Volcanoes: Concrete presentation. — One device for giving pupils a concept of volcanoes is to observe coke, ashes, and iron slag, which are known products resulting from the action of heat; to explain the formation of the earth by the process of cooling of the surface while the interior still remained hot; to make drawings to illustrate earth's crust, heated interior, and cracks in earth's crust; to show picture of active volcano; and to read or give vivid description of the action and results. This plan gives the general idea of a volcano without much emphasis upon details.

ANOTHER PRESENTATION. — This plan involves a scientific treatment of the topic. In matter and method it

is suited to older pupils. Heat of the interior of the earth is explained and proved as follows:

1. Hot springs are evidence of interior heat. Some found as far north as Iceland.

2. Geysers are another indication of interior heat.

3. Increasing heat in mines. Heat increases about one degree with every sixty feet of descent into the earth.

4. The nebular hypothesis regarding the formation of the planets explains the existence of the heated interior and the cooling crust. In the process of cooling the contraction causes many fissures, foldings, and openings in the crust or surface of the planet.

ACTION OF VOLCANOES. Water from the surface of the earth passes through the openings into the heated interior; the heat expands the water into steam, and this added power causes an explosion or eruption. The matter thrown out during an eruption is lava, or melted rock, pumice stone, water, steam, sand, mud, cinders, and ashes. The opening through which the materials are forced is the crater of the volcano.

Noted volcanoes. Mauna Loa and Kilauea in Hawaii, Chimborazo in South America, Hekla in Iceland, Etna in Sicily, and Vesuvius near Naples in Italy.

GRAPHIC AIDS.

1. Pictures of extinct, dormant, and active volcanoes.

2. Drawings of vertical section showing base, cone, crater; the process of mountain building around crater; the contour of the volcanic mountain and the distribution of ejected materials.

3. Maps showing location of principal volcanoes.

4. Specimens of pumice stone, lava, ashes, etc.

5. Narration, description, and illustration of the destruction of Pompeii.

6. Stereopticon views.

DEFINITIONS. A volcano is a mountain or hill, usually more or less conical in form, from which lava, cinders, steam, sulphur gases, and the like are ejected; — often popularly called a burning mountain. — *Webster.*

This definition is scientifically inaccurate. A volcano is not necessarily a mountain; the mountain is the result of the accumulation of material ejected by volcanic action. Again, a volcano is not a burning mountain; the explosion is not a process of consuming material by burning.

A volcano is a hole in the earth's crust from which steam, lava, or ashes are or have been thrown. — *Dexter and Garlick's Object Lessons in Geography,* page 155.

A volcano is essentially a vent in the surface, through which rises some kind of molten rock, which, upon accumulating, builds a conical peak. — *Tarr's Elementary Geology,* page 329.

Illustration of Eruption of Vesuvius

Large glass vessel, small bottle of red wine, clay or sand, water. Form miniature mountain on bottom of vessel; make small hole in cork of wine bottle and then cover bottle with sand; put water in vessel. When ready, stir the water. The water removes sand from hole in cork and the wine ascends in a whirling plume. — *McKay's Magic Experiments,* page 30.

500. Winds.

I. CIRCULATION OF THE ATMOSPHERE. The air is very elastic and so it is easily put into motion by changes in temperature. Heat causes air to expand, become lighter, and rise. This upward current of warm air is replaced by heavier cool air which in turn rises after becoming

heated. Apply this explanation to the large areas in the equatorial regions and notice four great movements in the general circulation of the atmosphere:

1. The inflowing surface winds.
2. The uprising heated current.
3. The outflowing winds at high elevations.
4. The descending air at considerable distance north and south of the equator.

II. Relation of air pressure and wind. The rising column of warm air pushes away the air above it, thus decreasing the barometric pressure; but the reverse is true in regard to pressure when the cooling air becomes heavier by condensation. Then it follows from the last topic that wind and air pressure are closely related.

501. Trade winds.

I. The name. The name trade winds is given because commercial vessels take advantage of the aid given by these winds.

II. Location. In Atlantic Ocean 8° to 29° N. and 3° N. to 28° S. In Pacific Ocean 2° to 25° N. and 2° to 21° S. latitude. It is sufficient to say about 30° north and south of the equator.

Cause. Cooler air rushing in to replace rising air in equatorial regions. See explanation in circulation of atmosphere.

III. Direction. From the northeast in the northern hemisphere; from southeast in the southern hemisphere. Such incoming air tends to blow from north and south; but the earth's surface at the equator is moving eastward at the rate of seventeen miles a minute, and so the wind lags behind.

IV. Effects.

1. Aid navigation. Columbus followed this route.

2. Coming from cold regions, they absorb moisture and thus cause deserts.

3. Absorbing much moisture from the ocean, they produce abundant rainfall on sloping coasts.

4. The meeting of so much warm air at the equator produces an upward movement over an area nearly 400 geographical miles wide. This area is the belt of equatorial calms.

How to Study a Map

502. Importance. — This is only one more phase of teaching pupils how to study. Lay aside theoretical discussion and join a healthy class in studying Asia. The response will convince you of the direct value of community effort. Here are some of the real conditions in an effort of this kind:

1. Geography is disliked by some pupils because it has not been well taught. The pupils have not been taught how to use the text-book.

2. Every pupil has a geography. The ownership of the book or the right to use the book is a native impulse waiting for invitation to react, according to James and Thorndike. The handling of the book gives employment to the hands, — another suggestion of freedom from mischief. The coloring of the map appeals to the eye. In brief, such presence of material means a kind of business that appeals to a healthy class.

3. The teacher works with the pupils. There is a natural interest in such mutual observation, interpretation, and discovery; and a derived or acquired interest follows for all pupils who experience for the first time the joy of finding how much can be learned without reading even one line of the text.

503. The process of studying a map. — A large globe, a map of Asia, a map of the world, and a relief map of Asia are ready. Light, heat, ventilation, and comfortable position are physical requisites. Preliminary questions on globe and maps will secure attention and thereby prepare the minds for united and individual effort. Such questions will determine comparative location, size, and shape; location of highlands and lowlands; general direction of mountains and peninsulas. Now turn to individual maps; eagerness guarantees activity. The map study gives information on these topics.

1. Actual location by latitude and longitude; land and water boundaries.

2. Size. The largest continent; the largest mountains, rivers, seas, bays, countries, peninsulas; and, by inference, the largest population, forests, animals. This inference requires later proof from text.

3. Surface. The location, direction, extent, and names of mountains; the three great slopes as indicated by direction of flow of rivers; the names of rivers and the bordering waters; important lakes and seas.

4. Climate. Probable conditions by comparison with North America; application and probable results of each of the causes affecting climate. Here, again, is another invitation to later use of the text to verify inferences.

5. Countries and their chief cities; apparent means of commercial intercourse.

6. Industries, products, and commerce. Map study alone cannot give the accurate knowledge required, but it can correlate old knowledge and also make pupils think and justify their thoughts in advance.

7. The people. Prior information is considerable. Note vast extent of lands of the different peoples.

Pupils' results from studying the map:

1. Social pleasure.
2. Self-satisfaction in progress.
3. Prior knowledge recalled, applied, correlated.
4. Desire to study text to verify conclusions.
5. Consciousness of increasing power in studying.

How to Study the Text

504. Difficulties. — There are certain difficulties in teaching the intermediate grades and it is well to consider first the reasons why pupils do have such difficulties in using the text in geography.

1. Poor teaching. It is a safe rule that says pupils should use text-books as soon as books can be used advantageously. But notwithstanding this view, some teachers do not require pupils to use the books furnished. The teachers make notes from the books, write the notes on the board or dictate them, have pupils copy and then memorize. This plan robs the pupil of his right to learn to do by doing; it is a waste of time; it exalts the memory; it develops a habit of absolute dependence upon the teacher.

2. Defective books. Some text-books are badly planned. Pupils have to search in three or four parts of the book to find the required facts. Some books are not well arranged. The matter may be found in one place, but topics are not given; or, if topics are given, the order is neither logical nor pedagogical. Other books are not adapted to the capacities of the pupils; scientific style, or undue emphasis of causal relations when the causes are not understood, or the presentation of a confusing amount of details.

3. Inactive pupils. This condition may be largely

due to poor teaching and defective books. The pupils do not feel a necessity for such knowledge. In the section on how to study a map, a way of arousing a desire for study of text has been suggested.

505. The Process of studying the text. — The six topics followed in the study of the map make a topical series for guidance in studying the text. Whether the arrangement of the text is in that order or not, the pupils are working under definite aims. The pupils must classify the facts under the topics; the efforts must be systematic; and the mental result should be a tendency toward a habit of thinking.

506. Suggestions for the aid of pupils in studying the text.

1. Pupils must feel the need of the facts in the printed matter.

2. Pupils should have a guide in their study, such as topics, questions, etc.

3. The teacher should work with the pupils to see that they acquire proper habits of application and interpretation. There is too much scattering of energy.

4. Have pupils read a portion of the text, tell explicitly what the author means, and comment upon it or otherwise apply it. It is a very valuable exercise in observation to have pupils read exactly what is printed, give its precise meaning, and then express a personal opinion upon it.

5. Proof. The printed text must disprove or verify the conclusion reached in the study of the map. Here is authority vs. opinion. Judgment and reasoning are required in every complete act in this kind of study. The map might suggest the tundras as an inviting home for man, but the text describes those mossy swamps as

suited only to nomadic tribes who manage to live upon fish and fur-bearing animals.

6. Comparison. The study of North America and Europe has habituated pupils to associate climate, occupations, and productions according to zones. Such types of knowledge are used in map studies; but the text must furnish the conclusive facts to enable the pupil to ascertain the truth by comparison and contrast. Tabulated facts in parallel columns give a mode of visualizing truth in the field of world geography. As in proof, here, too, the text must be used for accuracy.

7. Synopsis. Critical study of the printed matter is insisted upon in each of the foregoing suggestions. Another means of mastering the text is analysis by outline. The value of this exercise is fully presented in the chapter on composition.

8. Abstract. Another way of making the thought of another a part of one's self. See chapter on composition.

9. The text is a source of information for individual discussion and class debates.

507. Characteristics of modern text-books.

1. Enrichment; physiography.
2. Pertinent illustrations.
3. Unit areas vs. unrelated facts.
4. Heuristic questions.
5. Inductive development.
6. Political and industrial relations exalted.
7. Topical arrangement.
8. Causal series, cycles, comparison.
9. Types as apperceptive bases.
10. Correlation with science, history, and literature.

CHAPTER XIII

HISTORY AND CIVICS

508. An institutional subject. — Butler and Spencer have advocated institutional training as a desirable preparation for life. John Dewey, Horace Mann, and others have come out strongly for citizenship as a worthy ideal. The subject-matter of history and civics is coming more and more into use as suitable means of helping pupils toward the ideals advocated by leading educators. The suggestions quoted in the following eight sections are pertinent.

509. Early work in history. — In the lower elementary grades, topics introductory to history will be found in the fables and myths and in literature and geography lessons. As pupils in the earlier years take an intense interest in events associated with life and endeavor, the subject-matter of the lessons in history should be chiefly biography and the record of events which have visibly shaped or influenced the destinies of man. Only a brief sketch of each topic is expected; no notes should be dictated by the teacher; no home study should be required of pupils in grades below the eighth year. The reading of library books should be encouraged.

510. Geographical background. — The teacher should see that pupils have a proper geographical background for all historical events. Appropriate use should be made of pictures, reference books, and maps to give a

fit setting to the narratives, to show the political and physical boundaries, to indicate territorial growth and expansion, and to illustrate the progress and purposes of movements in warfare. The judgment of the pupil should be exercised in tracing the causes as well as the progress and outcome of great historic movements.

511. Current events, anniversaries, excursions. — Attention should be given to current events and to historic anniversaries, as Lincoln's Birthday, Washington's Birthday, Decoration Day, Independence Day, and Thanksgiving. In order to make the subject of history real and vivid, pupils should be encouraged to visit the Metropolitan Museum of Art, the American Museum of Natural History, the museum of the Brooklyn Institute, the historical and general libraries.

Civics

512. Members of society. — Pupils should be taught in all grades, as far as they may be made to understand their responsibilities and privileges as members of society, and that as such they owe duties to the school, to the family, to the neighborhood, to the city, the state, and the nation. In this way they may be led to comprehend the principles of government and their individual duties in connection with it. The necessity for obedience to authority should be dwelt upon, as also the moral obligation of working with the various departments of the government and not against them. Wherever possible, the reasons for conduct should be explained. If the child knows the reason for any law, he will obey that law more readily.

513. Topics for discussion in all grades. — In all grades there should be frequent discussion under these

headings: Obedience to law; Why laws are made; Who makes the laws? Who enforces the laws? Why are law-breakers punished?

514. Importance of local ordinances. — Principals and teachers are urged to lose no opportunity to impress upon pupils the importance of city ordinances that are specially applicable to local conditions. Pupils should be led to see that even slight departures from the standard of order and good administration become very serious matters when many persons engage in them, and that, therefore, each individual should be careful to avoid acts, such as throwing paper and fruit skins into the streets, which, though trifling in themselves, would, if they became general, tend to impair the cleanliness and health of the city. In teaching the "duties of citizens and public officials," special attention should be directed to the work of the departments that come under the immediate observation of pupils.

515. Government by the people. — In the higher grades of the elementary course pupils should be led to appreciate the force of Bryce's statement that "the greatest problem that free peoples have to solve is how to enable the citizen at large to conduct or control the executive business of the state." It is very important that all young people should be made to understand that in this country government is not something apart from the people, but that it is established by the people themselves, and that there are orderly ways provided for giving effect to the will of the people.

516. Aim of history and civics. — The educational aim of civics as of history is to give a body of ideas and a trend of action that will assist the child to become an intelligent and a patriotic citizen.

John Fiske says: " The child should be so trained that he will always retain something of interest in reading history, something of power in following up a line of ordinary investigation, something of a disposition to seek for the underlying causes of events, something of a grasp of the mighty tendencies and movements of history, and some inkling of that conception of history that makes it a teacher of the present out of the wealth of its past."

517. Result sought. — First, to make the present full of meaning by showing pupils its origin in the past, to help them properly to understand the present, to develop truth, reason, and high ideals. Second, to develop patriotism by causing the pupils to feel a responsibility in preserving and upholding the institutions founded by their ancestors. Along the line of patriotism is habituation to civic requirements.

518. Habituation to civic requirements. — In discussing the ideals of education, citizenship is mentioned as one advocated by Horace Mann and John Dewey. For those who do not wish to consider education a preparation for the hereafter, the ideal of citizenship furnishes a satisfactory standard for effort; and for those who wish to make the supreme aim of education a preparation for the life to come, the ideal citizen may be considered one whose living in this life is a good preparation for the hereafter. The teacher who can influence his pupils to habituate themselves to adapt themselves to the requirements of the community in which they live, is doing all that can be expected from him under the general purposes of history and civics.

519. Definition of history. — Locke says that "History is the science of the development of men in their

activities as social beings." A German writer calls history "the politics of the past, and politics the history of the present." Mace (page 9) says: "History deals with the life of the people in the process of growth."

520. Value of the study of history. — While we have not thought it necessary to mention specific values of the subjects since all the subjects are deemed worthy of places in the course of study, special mention should be made of the ethical, patriotic, and practical value of history rightly taught. The ethical value may be chiefly derived from the study of the lives of great men as taught to children. See section 524. The patriotic value has been alluded to in section 516. Probably the consensus of opinion has established patriotism as the important reason for the study of history. This may be awakened by striking events which appeal to a pupil's feelings, illustrations of the beauties of one's country, deeds of illustrious men, the early struggles of the people, victories both military and civic, so that the pupil will have a pride in belonging to a country which has so many claims on his admiration. The natural interest awakened by historic places, buildings, scenes of battles, and peace conferences develop a love for the past so that these future citizens, in the changes which must necessarily come to a progressive country, do not lightly relinquish the old for the new.

Its practical value lies in the fact that history runs on in much the same channels that it has with the Anglo-Saxon race for hundreds of years. We touch the history of our fathers in all present-day national questions. Therefore as Bourne (page 81) says, "The surest road to a comprehension of our country, its institutions and its

relations to the world lies through history." It introduces pupils to the world of men and makes them acquainted with motives and actions. In its different phases, its political is represented by the government, its religious by the church, its educational by the school, its industrial by the occupations, its social by the family. The pupils are shown how great movements have been made and the effect of these. For the more thorough understanding of the present, they must know the past. By this knowledge their own judgment is exercised in regard to present questions.

521. The historical sense. — The historical sense is not a sixth "sense," nor a "faculty"; it is simply a feeling that the past can be rightly interpreted only when the student lays aside his own prepossessions, and seeks in the past itself a means of understanding the forces which moved the men of a bygone age, and when he enters sympathetically into the spirit which gave dignity to their institutions. — Bourne, *The Teaching of History and Civics*, page 9.

A fully developed character, such as is the aim of all education to inculcate, is lacking in one rich field, if it does not feel that historic sense which causes respect for past institutions and even places of historic note, though these may no longer be useful. The nation's historic sense, as shown in Holmes's *Old Ironsides*, was manifested in its opposition to the destruction of the battleship *Constitution* in 1833.

522. Extent of history. — In the elementary school, a good rule is to cover the history of our own country and as much of the history of other countries as affects our own. This is not a narrow view. It embraces a general knowledge of English history, some French, a

little German and Spanish history, and some reference to the history of other countries.

523. Method of teaching history. — Here again we face the problem of classifying ways or processes, as already discussed in chapters VII and VIII. Perhaps the easiest mode of adaptation is to conform to the suggestions and plans of approved text-books in history and civics until the effort of educators can secure for history the uniformity that has been secured for geography. Bourne's *The Teaching of History and Civics* is authority on methods. His liberal encouragement to teachers is illustrated when he says, page 168, if the teacher "can succeed in leading his pupils to study history, to comprehend it, to acquire the habit of reading historical literature, his method is sound."

524. Method in the lower grades. — The study of the lives of particular men, in connection with the different events in their careers, has been found a fascinating source of interest in history. This is especially true in the lower grades where most of the history is taught biographically. In regard to this, two hints may be given. One which does not detract from the interest in the grade and which is a benefit in the higher grades is this: Teach stories in regard to noted men and the events which group themselves about these men in chronological order. The second is an exception to the first, but it suggests itself because of the interest which naturally attaches to it: Teach an event upon the anniversary of the day when it occurred. The work of the fifth and sixth years would naturally be to put together events, or men and events, to recognize that there is a relation between these, and to build a skeleton into which later knowledge may be fitted.

The worth of biography is well expressed in Foote and Skinner's *Explorers and Founders of America* from which book these ideas are taken. The story of a nation's progress is largely written in the lives of its great leaders, and if we wish to create in boys and girls an interest in history and in historical reading we must appeal to their love for life and action. Great leaders exemplify in themselves the ideals and purpose of the people whom they lead, and through a study of their lives young people may come to know something of the causes which make for national success or failure.

A good example of a great leader will lead the class to see in him our country's progress.

All the religious zeal, the self-denial and the devotion to duty, which characterized the era of colonization and settlements is told in the lives of founders and the early leaders of the colonies. Customs and manners may be gained from study of characters.

If associations are carried on in this way, the child will have some appreciation of the causes which led to the industrial and social development of a great people, some quickening of imagination, and some admiration for courageous perseverance in the face of difficulties and some respect for duty. If we kindle these qualities of mind and heart, we shall make our children good citizens and lead them to see that they can make their lives sublime.

525. The teacher's preparation. — The ideal teacher of history is one who has been especially trained for this work. Unless a teacher has a broad view of his subject and can grasp the whole situation, as a teacher of many subjects cannot do in all of them, the proper relation of parts cannot be well maintained. But it is

possible for every teacher to be reasonably well prepared, and for this purpose a brief plan is suggested.

Take any good text-book like Fiske or Gordy for the United States. After a thorough reading, note the periods into which, in your own mind, the history naturally divides itself. Compare your own impressions with some good outline, such as Kingsley's or McLaury's, and then decide upon a composite outline for class use. Take whatever period is to be studied and subdivide it before you conduct the recitation. Two illustrations are given.

ILLUSTRATION I. Revolutionary period.

1. Causes which led up to this.
2. Objects of British.
   (*a*) To separate the colonies.
   (*b*) To cut off colonies from the south.
3. How this was accomplished.

Under each of these large divisions there would be several subdivisions.

ILLUSTRATION II. Under the large topic of the Period of Settlement are several subdivisions. One of these is The Settlement of Rhode Island.

1. Purpose of Settlers. To found a place of refuge for those who suffered religious persecution in Massachusetts.
2. Chief Settlers.

   (*a*) Roger Williams. Founder of Providence. Banished from Massachusetts because of religious views, — separation of church and state and that no one should be obliged to support the church.

   (*b*) Anne Hutchinson. Founder of Portsmouth. Banished from Massachusetts because of religious views.

3. Government.

(*a*) Obtained a very liberal charter from the King similar to that of Connecticut.

(*b*) Perfect religious freedom.

A caution to be observed is to keep your bearings. Do not let detail lead away from the large theme. If time is limited, an outline already prepared may be used. Do not make it dead by mathematical precision, but let the human element, the feeling in regard to events, make it mean something and keep it alive. Beyond this, in order to intensify his interest and make his subject real, the teacher should read at least one of the original historical documents, as Bradford's *History of the Plymouth Colony*, or *Sources relating to the Norse Discovery of America*. These may be found in any well equipped library. The teacher will feel fully repaid for the reading by the power he feels in teaching a subject which he knows from the original documents, and will realize the practical value because it furnishes one criterion for the selection of text-books which are true to facts.

526. Topical method. — This method would be the one naturally followed by a teacher whose preparation has been similar to that just described. It is necessary for the guidance of the teacher to have at least a plan of work for the term mapped out by topics.

The supreme value of the topical method is exemplified in the work in history.

One view of this method presents a whole lesson under a series of topics arranged in logical or chronological order. These eight or ten topics, for instance, furnish a guide to whatever the pupil is expected to do in that recitation. Another view of the topical method selects

one general topic for the subject of the recitation and then there are a few subordinate topics assigned to be covered in the various ways of conducting the recitation. One topic may be set for oral or written review; another may cover the required work in collateral reading; another may be for general discussion to develop the pupil's power of expression and his sense of sound judgment; while another may be the direct preparation for the work of the succeeding days or weeks. Whatever the arrangement of the topics may be, the aim should be definite assignment, to direct pupils toward what they should try to learn, where they may find information, and how they may make that information a part of their own mental possession.

527. Text-book method. — Here again we must dissent from the adverse criticism of the use of text-books. The text-book is the source of information for every pupil, and no teacher has a right to deprive the pupil of his right to use his own activity in the field of education, nor can any teacher take the place of an accepted text-book in this or any other subject. More adverse criticism of text-books is not needed; some devotion to the ideal in teaching pupils how to study a text-book is what is needed. To attain this ideal the teacher should be the master of the text-book, not a slave to it. In this as in the topical method important events are to be emphasized, and minor details and connecting events omitted altogether or kept in proper perspective. Doubtless the best results can be secured by a combination of these two methods. The text-book is certainly necessary even though the topical method be used.

528. Source method. — The source method of teaching history, as the word source implies, requires students

to consult the original documents from which history is written, and then form their conclusions upon that material. This method applied in the elementary schools would be presented in a text-book not in narrative form, but in the form of summaries, tables, and brief reproductions of the original documents. For elementary pupils, this method cannot be commended. The pupils lack the foundation knowledge for forming an opinion on the material furnished and, besides, they have not yet acquired habits of study that will enable them to interpret the materials without a great deal of collateral reading. The collateral reading in connection with an authorized text-book in the class may introduce the pupils to the source method in some lines of investigation. Selections read by the teacher from original sources serve a twofold purpose; they put that life into history which can only result from making it real, and they introduce children to the field of original sources. Selections from the following are of especial interest to pupils of United States History in the seventh and eighth years: Beverly's *History of Virginia*, and Josiah Quincey's *Figures of the Past*. As the study of history in the elementary school is not supposed to be intensive, only a mere introduction to source literature is all that can be recommended; otherwise, the regular work of the course would be neglected.

529. Collateral reading. — " The object of collateral reading is twofold: it supplements a text-book, giving the student additional information and describing the same events from new points of view; and it also cultivates the student's interest in history as literature." This is Bourne's opinion as stated on page 158. Gordy advises the use of a short list of good references rather

than the reading of many books. He advises that each pupil read one good reference book in addition to the text-book. Probably many teachers have noticed the shock that a young pupil experiences when for the first time he finds text-books disagreeing. This is an opportunity to make him realize that books are written by men; that in the main historical points men agree; but that in minor details the author may give his own point of view, or present information that is not authoritative.

Another advantage derived from collateral reading is the skilful use of books. Too many pupils in the elementary schools are entirely helpless if asked to look up a certain topic. History offers a greater opportunity than any other subject for practice in getting definite information.

530. Open text-book recitation. — " An excellent suggestion is that of 'open text-book recitations,' in which with their books before them, pupils are asked questions on cause and effect, on relations with previous lessons, etc.; answers may, if necessary, be written out and corrected in class. Such an exercise trains pupils to take in the thought of a printed page, and to grasp the essential points.

"Such a system tends to encourage the habit of applying what one knows to a new problem. Still more helpful in the same direction are the off-hand discussions and impromptu debates which spring up in an eager class, and which should be encouraged by every good teacher." — *Committee of Ten.*

531. Cause and effect. — Whatever the method of recitation may be, the training of the judgment will require pupils to trace the relations between cause and effect in all the great events of history. See causal series in geography, section 459.

Events are meaningless without their settings. The cause, the event, the effect are what arouse interest, demand thought, appeal to reason and judgment.

532. What should be memorized. — "How far should pupils be expected to memorize? 'A few things should be learned by heart and, when forgotten, learned again, to serve as a firm ground-work upon which to group one's knowledge: without knowing the succession of dynasties, or of sovereigns, or of presidents, or the dates of the great constitutional events, the pupil's stock of information will have no more form than a jelly-fish.' But those few necessary facts ought to be clearly defined as only a framework to assist the memory." — *Committee of Ten.*

Taking an application in United States history, we suggest that pupils learn thoroughly the names of the presidents with dates of administrations and the political party to which each belonged. In the study of the constitutional period, this will be found to be indispensable as a framework for all important facts of recent history. The learning of long lists of dates is no longer considered a legitimate part of history. The memorizing of particular dates in relation to epochs or periods is all that is essential, with one or two others which mark the important event in some movement. The dates which are learned should be learned accurately. Gordy says dates are valuable in giving perspective to reveiw work.

533. Verbal repetition. — It is not necessary to give much space to reasons why verbal repetition of the matter in the text is not the way to teach history. This kind of recitation is the cause of severe criticism against the teaching of the past; but a little experience with

teachers of this decade leads to a commendation of their tact and judgment in matters of this kind. Only poems, national songs, and prose selections, which have been written with reference to some historical event, are to be committed to memory for verbal repetition.

534. Correlation. — Correlation with geography has already been mentioned. Literature is another study that can contribute a large share of interest and use. Masterpieces in poetry and prose often present the facts of history under the charm of literature. Lincoln's Gettysburg Speech is an apt illustration of the correlation of oratory and history.

"The teaching of history should be intimately connected with the teaching of English: first, by using historical works or extracts for reading in schools; second, by the writing of English compositions on subjects drawn from the historical lessons; third, by committing to memory historical poems and other short pieces; fourth, by reading historical sketches, biographies, and novels, outside of class work." — *Committee of Ten*, page 164.

535. Reviews. — Our point of view was expressed in a general way in section 134. That view has particular application to history. Good teaching will require a summary at the close of each recitation; the assignment of home study will be largely a matter of review rather than advanced preparation; the making of outlines of the matter covered in the regular text or of the matter in collateral reading is another valuable exercise; and extemporaneous speaking upon assigned topics or brief written summaries during the recitation period will tend to systematize the whole work under some comprehensive plan of presentation.

Aside from this daily review, when a period has been covered it should be given a general review in order to see that the pupils hold the subject as a unit and also to strengthen the impression. This review should not be a restudy of the subjects as presented in the original lessons but should be attacked in a fresh way. This will avoid loss of interest and help the pupil to organize his knowledge more thoroughly.

Illustration

After the completion of the study of the Civil War take up the history of slavery. This has already been studied in connection with the period of colonization, in the provision for the non-interference with the trade until 1808, in the effect produced upon it by the invention of the cotton-gin, in the Missouri Compromise, and in the question of whether new states should be admitted as slave or free. In the review, let slavery be taken connectedly. For such a review excellent results can be gained by the preparation of outlines by the pupils.

Gordy suggests three kinds of reviews:

1. Reviews may be *chronological*, but must connect and associate each one with some important event.

2. Reviews may be *biographical*. Noteworthy events may be associated with the names of men.

3. Reviews may be *geographical* when association of events is to be with places.

Topical reviews are thus defended in Cornman and Gerson's *Topical Survey of United States History:*

"Sound psychological and pedagogical consideration demands that this review should not consist of mere repetition, but should, as far as possible, be presented

in a fresh guise, and aid the pupil in organizing the knowledge which he has already acquired. The various elements of the matter to be reviewed should be closely interrelated, essential features emphasized, and a broader range of view disclosed, so that the knowledge as a whole may form an apperceptive system to which future acquisition may be readily related."

536. Use of outlines. — This plan is advocated as one of the best means of teaching pupils how to select and comprehend the essential points in the printed text. It is difficult at first, and needs the personal direction of the teacher; but a little practice in it gives a consciousness of growing power so that the pupil will soon be anxious to follow this kind of individual work. Outlines prepared for guidance in study would, of course, obviate the making of similar outlines by the pupils. Teachers differ in their views of the value of such outlines in connection with the study of advanced lessons, but there is almost unanimous opinion in favor of the outlines in reviewing a part or the whole of a subject. Cornman and Gerson's *Topical Survey of United States History* is excellent for reviews.

537. Note-books. — Elaborate notes are not useful to the elementary pupils. The mere copying of long extracts is not a prudent investment of time or energy. Use note-books for the following purposes:

1. Summaries of work. Similar to that described in sections 525, 526.
2. Progressive maps.
3. Review questions or topics.
4. References in connection with collateral reading that appeal to the owner of the book.

538. The use of maps. — The geographical maps are

absolutely necessary to fix the location of the principal places studied in history. This is one means of correlating history and geography. One caution to be observed is that the map shall not have too many places located upon it. Confusion must be avoided.

539. Progress maps. — A helpful means of stimulating visualization is the use of progress maps. Outline maps can be secured from publishers and so pupils need take no time in marking the limits of latitude, longitude, and boundaries. That part of map-drawing has little educational value. The progress map will then contain the location of the few principal points under consideration. Thus in the study of the early years of the Revolutionary War the map will have the location of Boston, Saratoga, New York, Princeton, Trenton, Philadelphia, and Yorktown. A line may indicate Washington's route across from Long Island up the Hudson and then down through New Jersey.

540. Debates. — History furnishes material for the frequent use of short debates. The value of such exercises is evident to all experienced teachers.

541. Questions prepared by pupils. — This plan of promoting self-activity and co-operation has been emphasized, from time to time, in this book. Personal experience is the justification for such commendation. Gordy, in his notes *To The Teacher*, says: " The pupils should be required to prepare a written question on every lesson. The value of this simple device in leading them to note the working of cause and effect cannot easily be measured. If pupils have not been trained to ask such questions they may at first be diffident about it. They will also ask questions that call for yes or no or for single-word answers. With a little judicious help,

however, they will soon begin to ask searching questions that will stimulate the interest of the entire class."

542. The use of illustrations. — The word illustrations in this topic has reference to the pictures or other illustrations in the text-book itself. One essential of any good text-book is that it shall not be overloaded with details. So, too, of the use of pictures. The illustrations are intended simply to strengthen the matter already given in the printed text. The limit to be observed is the truthfulness and the usefulness of the illustrations inserted.

543. Collection of prints and pictures. — In speaking of school decorations we advised the use of a few superior paintings in place of a large number of cheap prints and pictures. The same caution may be applied to history. It is suggested that a large scrap-book be used for keeping the prints and pictures instead of posting them on the walls of the schoolroom.

544. Excursions. — Fortunate is the school that is located within the field of historic experience. Excursions under the plan described for teaching geography cannot fail to produce satisfactory results in impressing the facts through the aid of concrete interest.

545. Dramatization of historic events. — Teachers can hardly be expected to put the historic material into dramatic form for presentation in rhetorical exercises, but it is possible to secure such material already dramatized. Such exercises in school will be found one of the most valuable means of promoting a healthy school spirit. A little play called the *Continental Congress*, in which pupils take the parts of those who adopted the Declaration of Independence, may be mentioned as an illustration of this phase of the work in history.

546. Use of mnemonics. — Anything so artificial is not approved as a method of teaching; but it is a device that may have some value for some pupils. The following illustration suggests an ingenious and helpful way of remembering the events connected with slavery agitation.

Notice that the first letters of the seven lines spell slavery.

Sixteen hundred nineteen — Introduced 1619.
Law prohibiting slaves imported — 1808.
Admission of Missouri — 1820.
Violent opposition to annexation of Texas — 1845.
Emancipation Proclamation — 1863.
Rebellion the outgrowth — 1861–5.
Year of 1865 — Thirteenth Amendment.

547. How to arouse interest. — The summary of the last twenty-six sections will present a number of points of view on the teaching of history. A condensed expression of the substance of these points of view will give the means of arousing interest in teaching the subject to elementary pupils.

548. Civics. — This is part of the life of today. At a very early age the child comes into contact with civil government. Just as in the study of history, first he learns disconnected facts in regard to city government, also in regard to home and school laws, election, taxation, political parties. In the seventh and the eighth years these isolated facts are gradually brought together in a whole represented by the national government. The laws of state, county, town, city, school, and family are fitted into this whole.

549. Local government. — The study of the forms

and uses of local administration is a part of the early work in all the grades in New York City. It is what is called institutional presentation of history and civics. To impress the utility of such government, many of the schools have adopted forms of pupil self-government to represent the departments in the larger municipal organizations. Wherever the school may be, it is possible for pupils to study the government related to them.

550. Process of legislation. — Another means of increasing civic knowledge is for pupils to make a special study of the three departments of government in the state and in the nation. The history of a bill from the time that it is introduced until it has been under judicial approval is one of the valuable topics in relation to history and civics. Turning the class or the school into a legislative body for this purpose is one concrete method of presenting the work.

551. Institutional study of history and civics. — In the five kinds of inheritances mentioned in Butler's definition, the institutional inheritance is found. The American tendency is strongly in favor of such training.

552. Common mistakes in teaching history and civics.

1. A pupil sometimes receives a good mark because he is a fluent talker, rather than because he knows and can connect facts. History offers many avenues to inaccuracy and a teacher must be constantly on his guard.

2. Past events are kept in the past. Make them real by bringing out how they touch the life of today.

3. Events are often left hanging in space. This may be avoided by the use of maps, by connecting events either logically or chronologically, and by giving attention to periods of time.

4. Indefinite assignment of lessons. This may be avoided by the use of topics with their subdivisions.

5. Too much prominence given to wars. Many great questions are fought out and decided in times of peace.

6. Taking sides. State facts. Do not warp the judgment of pupils by such strong partisanship that they believe that England had no excuse for the attitude she assumed toward the American colonies before the Revolutionary War, that the southern people were all rebels in 1861, and that the north contained all the men of principle. Views sufficient to arouse interest and enthusiasm should be given, but proper justice to both sides should be shown.

7. Making the study too critical. It is not necessary to spoil the enjoyment of and perhaps decrease the interest in history by raising a doubt as to the truth of a likely story. History should not be studied critically in the elementary school.

CHAPTER XIV

READING

553. Value. — Excellence in all other branches of school work is dependent upon ability to read well, and hence the basic importance of reading. But aside from its importance in the acquisition of knowledge in school, reading is a means of pleasure for ourselves and others during later life. Appreciative reading of good literature gives strength and refinement to character, and assures continued development of intellectual power through the use of the mental faculties.

554. Characteristics of books formerly used. — The use of the terms old education and new education is indefinite, partly because there is no distinct dividing line and partly because the former term is frequently associated with adverse criticism. A condemnation of the old is a popular argument for the new. It would be nearer the spirit of true teaching, however, to give full credit to the achievements of the past by using those achievements as a foundation for progressive development. There is nothing in matter or method that is entirely new; and surely child nature is the same, but we understand it better. Adaptation is the mark of modern improvement.

In speaking of the old and the new books in reading, there are differences which can be precisely stated. The old books had selections possessing intrinsic merit, but

the selections taken together did not make a unified whole. They lacked that continuity that is deemed essential for persistent development. The books were compilations of unrelated and unclassified fragments. Following is a summary of the leading characteristics:

1. Graded words and exercises without reference to content.
2. Moral stories.
3. Information readers.
4. Patriotic selections.
5. Literary masterpieces.

555. Complete works vs. selections. — The accepted point of view is quoted from an approved answer in a recent English examination.

"Another reform of great consequence has taken place during the past fifteen years in the teaching of reading. The movement had its origin in the conviction on the part of President Eliot and others that reading was too formal; that reading is but a means and not an end, and that so soon as the mechanical elements are mastered it should be used as a vehicle to transmit the contents of literature to the child. This reform, which was greatly assisted by the discussions and reports of the 'Committee of Ten' and the 'Committee of Fifteen,' has revolutionized the school readers and the courses of study throughout the length and breadth of the land. Courses of study in the elementary school now demand, in the upper grades, the critical and appreciative study of masterpieces of literature, and the school readers are no longer made up of 'useful information' and twaddle on moral subjects invented by the compilers of readers. But they contain, even in the lowest numbers, pieces that possess genuine literary merit. So that instead

of reading about *Jane's Doll* and *Jack's Top*, the boys and girls of the second and third grades read the poems of Longfellow, Field, and Cary.

In the secondary and collegiate courses similar changes have occurred. Formerly, courses in literature consisted largely of the mastery of treatises about literature and its creators. Now they consist of the concrete, first-hand study of entire masterpieces representing authors or types of literary form.

The changes may be summed up by saying that the courses in English have been infinitely enriched by placing the emphasis on the subject-matter of literature rather than on the mere form of mechanical aspect."

556. Guiding principle today. —The one great principle that determines correct methods of teaching reading is *from the whole to its parts*. This principle is applied all through the elementary grades.

557. Types of reading matter used at present.

1. Nonsense rhymes, such as Mother Goose. Reasons in favor — play in education, pleasure, interest; against — content lacking.
2. Literature of familiar things, such as toys, games, food, domestic animals.
3. Stories of primitive life of the race, early civilization, animal life, concrete heroism, Homer, Indian life, etc. Apply culture epoch theory.
4. Fairy stories. Imagination sees the good and the beautiful. Should stories be condemned because the true is lacking? No.
5. Fables. Literary inheritance.
6. Myths. The story in education.
7. Bible stories.
8. Poetry.

558. Principles determining the selection of reading matter. — The twofold relations of the individual and the community are factors for constant consideration. The mental requirements of the individual must be satisfied; the sociological or community interests must not be neglected. Hence, the two determining principles in the selection of reading matter are the psychological and the sociological needs. Such needs require

1. Material simple in thought and form.
2. Familiar words.
3. Suitable content.
4. Adaptability to individuals.

Analytic Methods

559. Analytic methods of teaching primary reading: word, sentence. — The word method in reading teaches a large number of words as wholes by associating the words with familiar things. The words are recognized at sight without knowing the spelling. Pupils have ideas when they enter school; they know many objects; they use many words; and so this method aims to teach pupils to recognize the words which are used in familiar language.

560. Word method. — The advantages claimed for this analytic method are the following:

1. The word is mastered by the eye.
2. It is from the known to the related unknown, as children can *talk words* when they enter school, and now they learn that the word is a picture and also a sign of some objective thing.
3. Alphabet, spelling, and syllables are learned incidentally.
4. It is natural because languages are developed one word at a time, the word being the unit of language.

Disadvantages of the word method:

1. Mastery by the eye alone is not a pedagogical advantage; multiple sense instruction is better.
2. Habit of guessing.
3. Incomplete without phonics, spelling, and writing sentences.
4. Considering the sentence as the unit of expression, the word method violates the principle *from the whole to its parts.*

561. Sentence method. — This analytic method begins with sentences and works down to words and letters. Two advantages are claimed:

1. The sentence is the unit of our language, since every complete thought must have a sentence for its expression.
2. Interest, apperception, and self-activity used in constructing and interpreting sentences.

Disadvantages of the sentence method:

1. Incomplete without the study of words, letters, and phonics.
2. Not suited to simultaneous teaching where dull pupils are present.

Synthetic Methods

562. Meaning. — The accepted meaning is given in section 210. Compare also sections 209, 211, and 212.

563. Alphabet method. — The alphabet method teaches the letters first. Sooner or later the letters must be learned as they are instruments of knowledge in the child's mental equipment. It is, then, an advantage to learn them as soon as possible. But usage does not favor this method because (*a*) it violates the principle of going from wholes to parts; (*b*) it is

neither the interesting nor the natural way of learning a language.

564. Phonic method. — The learning of the sounds of the letters is not approved as the first step in learning to read. These are the reasons for disapproval:

1. Some letters have too many sounds.
2. Some letters are silent.
3. The two arguments against the alphabet method.

565. Advantages of phonic training.

1. Pure tone.
2. Distinct articulation.
3. Power to read new words and pronounce them correctly.

Analytic-Synthetic Methods

566. Distinction not accepted. — The two classifications, analytic method and synthetic method, are not accepted as distinct methods by all educators. We have already directed attention to the point that there can be no complete mental act without both analysis and synthesis; and, under this interpretation, we may reject any method that claims to be strictly analytic or synthetic alone, or we may show that the classification is defective. The latter is preferred.

In the *Psychology of Number*, by McLellan and Dewey, we found an exposition of the mental process in passing from a vague whole to the definite. A similar psychological process is fully explained in McLellan's *Applied Psychology*. If every child's mind passes through that process, then every method of teaching primary reading is analytic, even though the distinctive steps are synthetic. Hence, any of the approved methods discussed in this chapter may be called analytic-synthetic.

567. Combination methods. — A liberal view of teaching primary reading includes the best features of the four methods mentioned. Thus the methods are made analytic-synthetic. Then add writing to coordinate motor activity; and, as another form of motor reaction, use dramatic expression as a means of interpretation through the aid of action.

568. Dramatization. — The value of dramatic expression is a modern contribution to primary reading. It need not be limited to primary reading, however, nor should it be. We have frequently emphasized the worth of oral expression in recitations, declamations, discussions, and debates.. Here we add one more suggestion in regard to using the dramatic instinct of children in all grades as a means of individual and social interpretation, expression, and impression.

In the *N. E. A. Report* for 1907, page 485, there is a short article on Dramatizing by T. C. Blaisdell, Professor of English Literature, State College, Lansing, Michigan. We quote three paragraphs and some of his suggestions:

" But why should not dramatizing be a potent factor in education? Children have an imagination far more vivid than have youths or adults. Left to themselves, unhampered by teachers and curriculum, children unconsciously become actors of power and dramatists of real human interest.

To illustrate: A few days ago I attended the out-of-door flag-day celebration of a two-room rural school. The program had been left to a committee of five girls. They had of course the conventional recitations and songs, a violin solo, choruses, etc.

But finally came an announcement that caused an expectant rustle among the fifty or sixty children and

the few visitors sitting on the sloping hillside. Charades were announced, and we were to "guess." They were not charades, however; they were effective little dramas, conceived entirely by the girls, without rehearsals, and, so far as I could learn, without any schoolroom experience in dramatizing. The Betsy Ross home during the making of the first flag was shown, the conversation between General Washington and his aides, and the famous flag maker, being given with a vividness that caused silence even among the boys of the somewhat restless audience. But the chief work of art was yet to come. Our young friend Malcolm was seen mounting his pony. He and his pony are a unit. And when he came crashing through the trees and in front of the audience crying "The British are coming! Be ready! Be ready!" he brought his audience to their feet. They cried out in their excitement, "Paul Revere! Paul Revere!" The dramatizing was done with vigor, and was received with a delight that does not pass. Will not Malcolm read of the famous ride of Paul Revere with a new power when next that poem is called for in the reading-class? And will not every boy and girl who saw the little play have a deeper understanding of the real meaning of the original ride and read of it with added joy and with more dramatic skill?"

569. Arguments for dramatization.

1. Children are eager to interpret life; hence, the desire to play stories, poems, songs, and home or vacation incidents.

2. Visualization. Pupils comprehend better after seeing; they become better readers and better appreciators of literature.

3. Overcomes self-consciousness. The enthusiasm is a powerful social stimulus.

4. Clearer images formed. Better talking and writing.

5. Strengthens the speaking voice, gives ease of bodily carriage, increases desire for knowledge, brings teacher and pupils into closer relations, and exalts the function of pleasure as a factor in education.

6. For reference, see Sara Cone Bryant's *How to Tell Stories to Children;* also, the books cited in 570.

McCloskey Method

570. Features. — This method of teaching reading combines the advantages of the four methods discussed in the preceding sections and also correlates reading and language. Special emphasis is placed upon the content of the reading matter. Some of the leading features are summarized:

1. The choice of matter that appeals directly to the interests of the pupils. Live objects are selected, such as, the story of *The Kid,* from the Jewish Talmud; *The Ox; The Little Red Hen; The Little Pine Tree; The Little Boy Blue.*

2. The vivid telling of stories by the teacher. The oral treatment of the story is the first step in the teaching. The story is told three times: first, to give an idea of the whole; second, to give the children a chance to fix the essentials in their right order; third, a rapid telling to bring all the parts together again. For suggestions for oral work with stories, see DeGarmo's *Essentials of Method,* pages 94–107; McMurry's *Method of the Recitation,* pages 26–29; McMurry's *Special Methods in Primary Reading,* pages 1–46.

3. The use of script forms in introducing the thought expressed in a sentence. This process combines the sentence method and the word method.

4. The transition from script to print. This puts the child into the use of text-book or printed sheets early in his school career. It gives him a chance to begin to help himself.

5. Oral language lessons based upon the written and printed sentences already treated. A reproduction of the material already covered gives the teacher an opportunity to make use of the dramatic instinct in the children. This dramatic rendering of the little stories is not strictly a part of the McCloskey method but it is used successfully by a large number of teachers who are using the other points of advantage in the McCloskey method. The written language work follows closely after the first oral language work, and absolute accuracy in getting capitalization and punctuation is required from every pupil. The progress in the line of structural composition is one of the marvellous results of this method of teaching.

6. Introduction of phonic lessons. After fifty or sixty words are thoroughly known at sight, the pupils are able to grasp the words as wholes and then the work in phonic analysis is introduced. The method of phonograms and blending is used.

7. The letters of the alphabet learned and used. This summary of features shows that the McCloskey method does use the sentence method, the word method, the phonic method, and the alphabet method, but they are used in the reverse order from that advocated in some schools. The principle from the whole to the parts is rigidly observed in this method.

Ward Method

571. Self-help. — This method is a combination of the word method and the phonic method. Later the other two methods are utilized in the reading lesson. The aim of the Ward method of teaching reading is to make the child independent. The phonic drill during the first two years of the work aims to give the child a key to the language so that he will be able to help himself in all the work in reading after the second and third years.

572. Sight reading and drill. — The oral work in the Ward method is divided into three distinct lines of drill:

1. Sight reading from the blackboard.
2. Drill on phonograms.
3. Drill on blend.

In the first half year of school the children are taught to read eighty-two words by sight reading and in every instance the teacher must see that the children understand what they are reading. In teaching a word the actual process of teaching is not done until after the children have been tested to see that they have the general thought conveyed by that word. These words are used in sentences from the very beginning and are frequently drilled upon in conversation or story. Along with this sight reading there is much drill upon phonograms and the blend.

573. Features.

1. The presentation of phonograms in a rational order. A phonogram is a written or printed representation of a sound; as, f, l, m, n, r, ing, ings, ight, ights. A word phonogram is a sight word used as a phonogram; as, ail, at, old.

2. The teaching of an initial stock of phonograms before any phonetic reading is done.

3. Thorough training in phonetic blending before any reading is done. This training aims to prepare the sense of hearing for quick, accurate perception.

4. Gradual introduction of phonetic words into the sentences used in the reading lessons. A sight word is a word that has been taught as a whole. Such words are recognized by the sight alone. A phonetic word is a word that the children are to read by means of combining the phonograms. The blend or blending is the union of simple or combined sounds into words.

Aldine Method

574. A general outline. — The actual procedure in the Aldine method is indicated by this outline:

I. PREPARATION.

1. Telling of the story.
2. Dramatization of the story.

II. ACTUAL READING.

1. Writing of the rhyme on the board.
2. Picture study.
3. Repetition of whole rhyme by individuals while pointing to the several words.
4. Instant recognition of the rhyme words pointed to promiscuously by the teacher.
5. Recognition of rhyme words written promiscuously on the board.
6. Drill with sight word cards.
7. Drill on sentences from the chart.
8. Seat work from the rhymes.

III. PHONETICS.

1. Initial consonants (no diacritical marks).

2. Vowel combinations and type words used with initial consonants to form word families.

575. The method justified. — We have secured a brief exposition of Aldine Reading from one of the originators of that plan:

"Aldine Reading as a plan or method is based on the natural interests, the spontaneous activities, the responsive and creative imagination, the feelings and the knowledge of children living the active, happy life of childhood. Into this life Aldine Reading comes not as a task that is artificial, foreign, and distasteful — a drudgery to which children must submit because they are little; into the child's life Aldine Reading comes as a delight, as a most fruitful resource, offering varied and undreamed-of opportunities for joyful childish activity, growth and happiness. Hence the not uncommon occurrence of a child's suddenly discovering in surprise that he has learned how to read, that he can read, that he is reading, and that he likes to read! He had never realized that he was learning that difficult art.

"But there is no magic about Aldine Reading. Like the marvellous achievements of applied science, its success depends upon the simple principle of understanding and utilizing, instead of ignoring and antagonizing nature. The child's nature furnishes the key, the sure guide to all the method there is in Aldine Reading. What does the child like — to see, to hear, to do? Does he like stories, rhymes, pictures, 'make-believe' games? All these he gets and takes part in from the very beginning. What subject, what content, must these stories, pictures, plays, and games have? Must they be full of simple action, full of appeal to the imagination, with now and then a touch of mystery and won-

der? Must the actors be animals and children and simple folk, fairies and personified objects of nature, with a strong bond of sympathy running through, uniting all and making them natural associates and playmates? All these simple requirements of childhood are satisfied in Aldine Reading.

"The three fundamental elements of the power to read well are (1) a reading vocabulary composed at first of words and expressions already in familiar use in the spoken vocabulary; (2) the habit of instantly associating suitable thought and feeling with printed symbols and, in oral reading, of expressing naturally and effectively those thoughts and feelings; and (3) the power and the habit of mastering new language and thought independently. These three are developed constantly from the child's first day in school. Every exercise of every description contributes to this end, some exercises developing chiefly one, some another of these elements.

"Here we may barely indicate a few of the most important means employed to develop the three elements of power essential to good reading, as given above. Although all these elements are developed at the same time, in the beginning they are emphasized in the order named; as factors in making good readers, however, their relative importance would place them in the reverse order.

"The initial reading vocabulary is acquired through the rhyme, the story, pictures, objects, and dramatizing; these, as means to the acquisition of a vocabulary, are of importance in the order named. The habit of associating suitable thought and feeling with printed symbols and, in oral reading, of expressing naturally and effectively those thoughts and feelings, is formed

and fixed through dramatizing, the story, pictures, the rhyme, and conversation; these serve this purpose in about the order given. Just how all these objects and exercises are correlated and made to serve effectively in the development of the first two elements on which good reading depends, is explained in the *Teacher's Manual:*

"The service of the exercises centring about these objects and ideas is not limited to the development of the first two elements of good reading; they also contribute to the development of the third and, in its far-reaching effect, the most fundamentally important of the three factors that determine good reading, the power and the habit of mastering new language and thought independently. In the development of this third factor, however, particularly so far as it has reference to the independent mastery by the child of the pronunciation and the thought of new words, most reliance is placed upon the treatment of phonics. Space permits here only the statement that children do learn in an incredibly short time to read independently and fluently anything that is within the range of their understanding. And they can read what they are capable of understanding wherever it occurs, in books, papers, magazines, and manuscripts; they are not limited at any time to specially prepared books; diacritical marks — that abomination of children's readers — have no place in the Aldine. For the full explanation of the treatment of phonics reference must be made to the *Manual.*

"The most fundamental principle in Aldine Reading is that the child shall apply from the beginning and constantly the knowledge that he has; that the teacher shall never do for the child what he can do for himself; and that all help given shall help the child to help himself.

This one principle of independence, variously stated from various standpoints, pervades every exercise, whether it be reading, phonic drill, dramatizing, or picture study; it pervades equally all the variety of interesting and purposive seat work which contributes materially to the development of good reading. Aldine Reading is vastly more important than any mere method or device for acquiring mastery of the mechanics of reading — it does lead to that mastery speedily; it is all-round, rich, sound education for the primary child; and withal, it is a joy to child and teacher, as all primary education ought to be."

576. Summary of advantages claimed

1. Analytic system.
2. Increasing interest stimulated.
3. Self-reliance promoted.
4. Abundant drill furnished.
5. Power of expression stimulated.
6. Self-activity always utilized.
7. Visualization constantly used.
8. Aesthetic appreciation developed.
9. Associative laws followed.
10. Systematic arrangement.
11. Enables pupil to read alone from books at home within the first ten weeks of the school year.

McCloskey and Aldine Combined

577. Eclectic tendency. — A choice of what seemed best in the McCloskey and the Aldine methods has given us a combination method as applied in a Brooklyn school. This method has not been tested above the third grade, but still it is a type worthy of consideration. The McCloskey reading was abandoned in this grade

because, at the start, it was found that the length of the sentences was too much for the beginners.

The chart with its pictures, the stories suggested in the manual, the phonetic and sight word cards of the Aldine System aid the teacher in presenting the subject and help to hold the pupil's attention. Since this system is based upon a series of rhymes, it works nicely into the McCloskey System. The *Aldine Manual* is adhered to for directions, and each lesson is conducted along the following lines:

1. Story is told by the teacher with the aid of the picture on the chart.
2. Dramatization by the children in which the rhyme to be learned is repeated as often as possible.
3. Rhyme is written on the board and drilled upon so as to associate the written form with the spoken word.

The first rhyme consists of four different words. The second one has six new words. These ten words form a basis for numerous drill sentences in which the rhyme is eliminated.

The sight word cards are used for the drills in recognizing the words already taught. These cards seem particularly good because the script form is on one side and the printed form on the other.

When the children have mastered about six stories and are able to recognize readily the written form of the rhymes, print is introduced. The rhymes being known by heart, the printed form is easily learned. At this point the primer is started. For a certain number of pages the work is identical with that on the chart. The print being smaller, the pictures colored and the book itself something new, interest is still maintained.

Phonetics are a part of the work, consonant sounds

only being employed in the first grade. The phonetic cards also are well planned, one side containing the capital and the small form of a letter and the other side the small form and a word beginning with that particular letter.

578. Good reading defined. — Interpretation of the author is good reading. The analysis of this definition will show that it covers all of the mental and the physical qualifications of good reading. The physical qualities are articulation, enunciation, pronunciation, pitch, modulation, time, accent, and inflection. The general position of the body and the holding of the book contribute much to these qualities. The mental qualities are the results of an application of the physical qualities so that the selection may be properly expressed. This *interpretation expressed* involves emphasis, placing of rhetorical pauses, fluency, and feeling.

579. Physical difficulties.

1. Distinct articulation and enunciation. Appeal to imitative faculty of child, the teacher being the model; have individual and class drills on difficult sounds and combinations like *th* in with, *t* in first, *r* in frog, *k* in sink.

2. Modulation of voice. Work for pure speaking tones, the teacher being the model again.

3. Weak attention. Have short, interesting lessons, and stop before interest wanes. Physical conditions often determine the duration of sustained interest. Timidity, bashfulness, and laziness should also be considered as causes.

580. Mental difficulties.

1. Association. Reading calls for a threefold effort: the idea in the mind, the spoken words, and the symbols

representing these words. This association requires time, as required by DeGarmo's *Law of Successive Clearness*.

2. Intelligence. Strive to get intelligent reading, not a mere pronunciation of words. See the term appreciative reading in section 586.

581. Reading to pupils. — In the lower grades the teacher's aim is to serve as a model in interpretation and expression, and, consequently, to arouse an interest in reading. The instinctive response through imitation is very strong. Aside from this desired reaction, the educative effect is powerful because the teacher's reading brings the content within the comprehension of the children. As the pupils advance in the grades the teacher's reading to them is not for the purpose of direct imitation by the pupil, but to increase interest and maintain a standard of good reading.

582. Meaning of words. — The meaning of words should be learned through the context rather than from formal definitions. For various ways of teaching the meaning, see sections 289 to 295 inclusive.

How to Arouse Interest in Reading

583. Information and drill. — The substance of this section is in harmony with what was said about preparation as one of the formal steps. See section 223. It has been suggested that, beginning in the second grade, " The reading lessons proper should be preceded by (1) such conversations as may be necessary to prepare the minds of the pupils for the appreciation of the subject-matter, and (2) exercise which will insure the prompt recognition of the form and the meaning of new words."

This second suggestion emphasizes the importance of drill as a means of reviving and clarifying old concepts to make them ready to blend with the new.

584. Removing difficulties. — This process is a continuation of the work in the last section, but the responsibility of finding and removing the difficulties must be shifted from the teacher to the pupils as soon as the pupils are capable of doing the work. In the fourth grade, for instance, pupils should use the diacritical marks as aids in the pronunciation of difficult words, and in the intelligent use of the dictionary. In all of this work, guidance is the function of the teacher, and consciousness of increasing power to help himself is the desired state of mind of the pupil.

Every selection in reading has certain difficulties, and it is imperative that pupils acquire an effectual habit of removing the difficulties that are obstacles to good reading. But here we meet a pedagogical question: Does good reading require the removal of all difficulties? If so, is not practice in reading sacrificed to collateral research? We may leave this question unanswered and direct our attention to the following difficulties and remedies:

1. New or difficult words. For a general treatment of teaching the meaning of words, see sections 289 to 295 inclusive.

2. Allusions and figures of speech. The teacher must be prepared in advance to explain whatever the child cannot find for himself. For allusions, give reference to pupils, if possible, and encourage them to look up the answers.

3. Words, phrases, or clauses out of the natural order. The first treatment of this difficulty of order in a sentence

is to lead pupils to arrange words, phrases, or clauses in the natural order, or the order commonly used in speaking. Then see why inverted or peculiar order is used in the selection. Is it for emphasis or climax?

4. Ellipses, especially of verbs. Use suggestion just made, namely, look for the usual form of expression. Try to discover the contrast between the elliptical expression and the full expression. What is gained by ellipses?

5. Words used under poetic license in advanced grammar grades. Teacher must explain and then have pupils notice such uses thereafter.

585. Enlarging native interests. — In the intermediate grades, teachers should give informal talks on books to read at home, being guided in recommendations by tastes and interests of the individual pupils. This suggested reading may develop an acquired interest that will lead to usefulness and culture. Teachers have frequently reclaimed wayward children by tactfully recommending a book that satisfied youthful interest, even though the book was not in the prescribed reading for the grade. After an initial effort of this kind, the assignments can gradually make a transition to the literature of the grade. Judicious assignment means what all good teaching means, — an adaptation to the needs of the pupils.

586. Appreciative reading. — In the first part of this chapter we spoke about the modern use of complete works in place of abstracts. It is the privilege of pupils to become familiar with all of *Snow-Bound, Evangeline, Deserted Village, The Bunker Hill Oration,* and other masterpieces that thrill the youthful mind by a realistic conception of human fellowship and literary power.

One reading is not likely to arouse a lasting interest; and so three readings are advised, each having a specific yet related purpose. Have one rapid reading to get conception of the piece of literature as a whole; part of the reading may be done by teacher, part by pupils in class, and part by the pupils at home. A second reading should clear away the difficulties in meanings, and pupils should try to get the thought and feeling rather than the form of the selection. The third reading is for effective oral rendering of those parts of the selection which make special appeals to the pupils' imaginations and sympathies.

The three readings constituted what was formerly called critical reading of masterpieces. Now we call it appreciative reading, or interpretative reading, because the practice of critical study has produced another step in intellectual advancement.

587. Oral reports. — The practice of giving occasional reports of collateral reading or other special assignment has the value already attributed to oral discussions and debates. Expression is a correlative of impression.

588. Memorizing. — The recitation of selected portions of masterpieces need not be associated with drudgery and timidity. The boy who voluntarily commits to memory one hundred lines of the *Deserted Village* will not have to be told that Goldsmith's theme was close to the life of the people. Teach pupils how to memorize a selection, give them frequent practice in facing the class, and then one phase of interest in reading will be maintained by the pupils themselves.

589. Silent reading. — A large part of the work of school and of life depends upon the power of reading silently. As all good reading means an interpretation of thought, it follows that the teacher's duty is to show

pupils how to get the thought from the printed page through the process of silent reading. This may naturally follow the ability to do good work in oral reading, but special exercises to test the children upon the work in the reading lesson and in the library books are recommended.

Articulation

590. Violations of articulation. — Articulation has reference to the distinct utterance of the sounds of the letters and syllables constituting a word. This distinct enunciation is violated in four different ways.

1. Suppression of a syllable; as, ev'ry for every, reg'lar for regular, and mem'ry for memory.

2. The omission of sounds; as, readin for reading, swif'ly for swiftly, and Feb'uary for February.

3. The substitution of sounds; as, ufford for afford, judgmunt for judgment, modist for modest.

4. Blending of the termination of one word with the beginning of another; as, this sworld for this world.

Accent and Emphasis

591. Definitions. — Accent is the stress of voice placed upon a syllable; emphasis is the stress of voice placed upon one or more words in a sentence. The difference in accent is illustrated by the pronunciation of words, thus: conduct, meaning behavior, is accented on the first syllable; conduct, to lead, is accented on the second syllable.

592. Emphasis illustrated. — Emphasis is frequently denoted in books by the use of italics, small capitals, or large capitals. But these indications are not always used, and so the interpretation of the piece to be read

requires the student to place the emphasis so that the meaning of the author will be properly expressed. We give two illustrations from the *Union Fifth Reader*, by Sanders:

"LIBERTY *and* UNION, NOW *and* FOREVER, ONE *and* INSEPARABLE."

Treason! cried the speaker; *treason,* TREASON, TREASON, re-echoed from every part of the house.

Absolute emphasis is the kind just illustrated. It belongs to the important words in a sentence, irrespective of contrasting emphasis. Antithetic emphasis depends upon contrasting parts of a sentence.

"People do not lack *strength;* they lack *will.*"

Inflection

593. Meaning and kinds. — The word inflection means a rising or a falling of the voice in reading or speaking. The four kinds of tones classified under inflection are the monotone, the rising inflection, the falling inflection, and the circumflex. Strictly speaking, the monotone is not an inflection at all because there is no rising or falling, but for convenience it is classified with the other three kinds of tones. Following is an illustration for each kind of tone.

594. Monotone.

"Thy will be done."

595. Rising inflection.

The noisy geese that gabbled o'er the pool,
The playful children just let loose from school;
The watch-dog's voice that bayed the whispering wind,
And the loud laugh that spoke the vacant mind;
These all in sweet confusion sought the shade,
And filled each pause the nightingale had made.

In these lines from the *Deserted Village,* use rising inflection on *pool, school, wind;* falling on *shade* and *made.*

596. Falling inflection.

Brutus. Go to; you are not, Cassius.

Cassius. I am.

Brutus. I say you are not.

Cassius. Urge me no more; I shall forget myself. Have mind upon your health; tempt me no further. —From *Julius Caesar.*

Falling inflection on *to, not, Cassius, am, not, more, myself, health, further.*

597. Circumflex for underscored words.

And this man has become a *god,* and Cassius a *wretched* creature.

Modulation

598. Kinds: pitch, quantity, quality. — Modulation has reference to the variations in the voice in speaking and reading. Modulation is both mental and physical and it depends upon the emotional interpretation of the selection to be read.

Modulation is expressed in three different ways. Pitch has reference to high or low tones of the voice; quantity means the volume or the loudness of the tones; quality has reference to the kind of tone. Pitch is easily distinguished by associating it with the musical scale. Quantity is measured by the volume of the sound, as soft or loud; and by the time, as slow or quick. Volume has reference to the stress; time has reference to the movement. Illustrations of the principal characteristics under quantity are given below. Number (1) is high and loud; (2) very loud; (3) quick; (4) soft; (5) very

loud; (6) plaintive; (7) and (8) slow and low. Selection and application taken from page 44, *Union Fourth Reader*, by Sanders.

(1) The combat deepens! (2) ON! YE BRAVE!
(3) Who rush to glory, (4) or the GRAVE!
(5) WAVE, *Munich!* all thy banners WAVE!
And CHARGE with all thy CHIVALRY!
(6) Ah! few shall part where many meet!
The snow shall be their winding sheet,
And every turf beneath their feet
(7) (8) Shall be a soldier's sepulchre!

— *Campbell.*

Quality of Tone

599. Meaning. — Quality relates to the kind of tone. Under ordinary classifications there are the four kinds. Sanders, an authority followed by nearly all the modern books, gives four definitions which we shall quote:

600. Pure tone. — The pure tone is a clear, smooth, sonorous flow of sound, usually accompanied with the middle pitch of voice, and is adapted to express emotion of joy, cheerfulness, love, and tranquillity.

Example

Hail! beauteous stranger of the wood,
Attendant on the spring,
Now heaven repairs thy vernal seat,
And woods thy welcome sing.

601. Orotund. — The orotund is a full, deep, round, and pure tone of voice, peculiarly adapted in expressing sublime and pathetic emotions.

Example

It thunders! Sons of dust, in reverence bow!
Ancient of Days! Thou speakest from above:
Almighty! trembling, like a timid child,
I hear thy awful voice. Alarmed — afraid —
I see the flashes of thy lightning wild,
And in the very grave would hide my head.

602. Aspirated tone. — The aspirated tone of voice is not a pure, vocal sound, but rather a forcible breathing utterance, and is used to express amazement, fear, terror, anger, revenge, remorse, and fervent emotions.

Example

Oh, coward conscience how dost thou affright me!
The lights burn blue. It is now dead midnight;
Cold, fearful drops stand on my trembling flesh.

603. Guttural quality. — The guttural quality is a deep, aspirated tone of voice, used to express aversion hatred, loathing, and contempt.

Example

Tell me I hate the bowl?
  Hate is a feeble word:
I loathe, ABHOR, my very soul
  With strong disgust is stirred,
Whene'er I see, or hear, or tell,
Of the dark beverage of hell.

Pauses

604. Grammatical and rhetorical. — Rhetorical pauses are those made in reading, irrespective of the construc-

tion or the punctuation of the passage. Grammatical pauses are those made in accordance with the construction and the punctuation of the passage. The former is illustrated:

Sweet was the sound | when oft at evening's close |
Up yonder hill | the village murmur rose |

605. Control of the breath. — As in all other school work there are two conditions to be considered, the physical and the mental. We have already spoken about the necessity of good physical conditions in each child and the consequent mental conditions. Good breathing requires proper position in sitting and standing. It involves practice in deep breathing and the general poise of mind and body. The child that is taught to breathe deeply will soon form the habit of breathing in that way most of the time. When he comes to the practice in oral reading, the breathing will then take care of itself and his attention can be given to the mental qualities of good reading, while the breathing will supplement his interpretation by means of the oral expression. The ordinary "setting up" exercises in physical culture are intended to put the body into physical conditions for effective breathing in all school work.

606. Extensive and intensive reading. — Extensive reading refers to the amount of reading done by the pupil; while intensive reading relates to the depth of the interpretation made. The present tendency is toward extensive reading. Stanley Hall and some other educators advocate the mastery of one good book in literature rather than the promiscuous reading of books. The latter may seem to satisfy the desires and views of the child, but there will be a lack of classified material

or an utter forgetfulness of the matter read. Intensive reading of a few good books will enable the pupil to get the thought of the author, to become familiar with the author's style of writing, and to form ideals worthy of imitation. There are arguments in favor of each kind of reading, but a personal opinion favors the latter kind.

607. Home reading. — The class library is designed to supplement school work and to furnish the teacher with such material as will attract the children to books, create a love for good literature, and encourage the habit of reading outside of school hours. A good rule to be followed in the selection of books is the one laid down by Dr. Hill in *The True Order of Studies:* "The most instructive reading for a person of any age, old or young, is that in which the author's tone of thought is above the average tone of the reader's thought, and yet not beyond his grasp."

The pupils should have convenient access to the library for reference work and general reading. They should be encouraged to draw books and take them home. Books should be kept not longer than two weeks without renewal; and such books as are in great demand should not be retained by a pupil more than one week. — *New York Course of Study.*

608. Literature and character. — This topic is inserted here to emphasize the need of more direction regarding what children shall read. The teacher of ordinary reading is supposed to give the child the power to interpret good literature, but her task does not end with that part of the work; she must supplement those efforts in teaching by trying to direct the child into habits of reading a kind of literature that will form character for life.

609. Patriotic selections. — There are two views regarding the teaching of patriotism. One mentions specific virtues in civic life and then proceeds to teach the necessity of having these virtues. This teaching is done largely through biography and history. The tendency toward imitation of the lives of great men and women is the principle upon which this kind of training rests. The other view is through the self-activity of the pupils in organizations for pupil self-government and in the supplementary reading of chosen selections which convey the highest ideals in American life. The latter process is the one that justifies the use of patriotic material in the course for reading. Such material exalts civic virtues, which are treated abstractly in the first view of patriotic training, but the teacher does not preach the necessity of following every one of these virtues. She hopes, however, to have the pupil, through the interpretation of the literature, recognize the ideals and feel it a duty and a pleasure to strive to attain such standards.

610. Biography. — In the chapter on history we spoke of biography as a correlated means of making historic events emphatic. A similar use may be found in reading. The selections in literature will have a stronger personal relation as the child becomes acquainted with the lives and characteristics of the author. This point of view alone justifies the use of a certain amount of biography as a part of the suitable material in the course in reading.

How to Memorize a Selection

611. The selection. — Choose a selection that will appeal to the interests of the class. It may be necessary

to educate the children to appreciate certain kinds of prose or poetry. In this process of education teachers should select material that will suit the children during the various steps in their development.

612. Copy in sight. — Use a selection that may be found in the books of the class so that each child may have a copy for his own use. If this is not possible, write the whole selection on the board so that it may be easily seen from any part of the room.

613. Biography of author. — Bring out the essential facts in the biography of the author.

614. Occasion of writing. — Show the conditions which led to the writing of the selection.

615. Business-like attack. — Don't make a long introduction in trying to arouse interest. Make the teaching of the selection a matter of business which every child in class ought to respect. The very fact that the selection has been chosen for this purpose is enough to invite respectful attention; and the facts brought out in the biography and in the conditions at the time of writing the selection are enough to interest an average class.

616. Physical comfort. — Have the pupils take a comfortable position, fix attention upon the matter on the board, and prepare themselves for concert work.

617. The memorizing. — The teacher should direct the lesson by having all pupils read the whole selection through once. Then take it by stanzas or paragraphs, and then the third time begin upon the sentences. Concert memorizing of a certain amount of the selection is made by means of visualization. Concert drill and individual drill follow.

618. Unifying review. — Review frequently from the

beginning so that pupils may hold the parts in their relation to the whole. Do not prolong the work to the point of fatigue. Grade selection according to the ability of the class to memorize, and stop when the complete selection is mastered. The completion of the process may be assigned for home work.

619. Rhetorical exercises. — The practice of having rhetorical exercises, from time to time, is to be commended as a useful exercise in school work. Those who have read the substance of this book do not need an extensive answer to this question. Such exercises are a kind of oral summary of the leading points in all the lessons; but as a means of bringing out the dramatic element in expression they have a far greater value. From what has been said about class discussions, debates, etc., students can summarize the points of value in rhetorical exercises.

620. Adaptation. — We have emphasized the necessity of adaptation all through the grades in the elementary schools and so that general principle can be applied to every exercise in the course in reading.

621. Variety. — The law of variety is a physical and a mental necessity. It is the one valuable point in the avoidance of fatigue. As the reading matter is one external means of adapting variety, it is not necessary to offer a longer defence of its use.

622. Correlation. — Since reading is necessary as a basis for all studies, it follows that reading must be correlated with all studies. It is not necessary, however, to make the recitation periods in reading lose their character as such in the effort to cover the work in geography, grammar, arithmetic, or other studies.

Memory Gems

623. Limitations. — To what extent should pupils be required to memorize gems from literature? What should be the characteristics of such memory selections?

A minimum assignment should be prescribed for every grade in the elementary school. The selections are intended to aid pupils in thought and expression rather than to serve as mere training for the memory. Each selection has the merit (*a*) of being adapted to the grade, (*b*) of teaching some desirable lesson, (*c*) of possessing literary excellence.

New York City Suggestions

1A

At least four lines of poetry per week, or an equivalent amount of prose, should be memorized by every pupil. The selections may be made from the following list:

Little Pussy — Taylor. The Dewdrop — Sherman. Who has Seen the Wind? — Rossetti. Sleep, Baby, Sleep (two stanzas) — From the German. The Rain is Raining All Around — Stevenson. The Wind — Stevenson. Boats Sail on the Rivers — Rossetti.

Mother Goose Rhymes: Humpty Dumpty. Mistress Mary. Little Jack Horner. Little Bo-Peep. Little Boy Blue. Baa, Baa, Black Sheep. Rock-a-by, Baby, Thy Cradle is Green. Rock-a-by, Baby, on the Tree Top. This Little Pig Went to Market, etc.

1B

The Sunbeams — Poulsson. Over in the Meadow — Wadsworth. Hush! the Waves are Rolling in — Old

Gaelic Lullaby. What Does Little Birdie Say? — Tennyson. The Baby — MacDonald. The Golden Rule — New England Primer. Robin Redbreast — Allingham. Twinkle, Twinkle, Little Star — Taylor. Nonsense Alphabet — Lear.

Mother Goose Jingles: Sing a Song of Sixpence. I Saw a Ship a-Sailing. I had a Little Sister. Peter Piper. As I Went Through the Garden Gap, etc. Thirty White Horses. Little Nancy Etticoat. The House That Jack Built.

2A

The Swing — Stevenson. Bed in Summer — Stevenson. Who Stole the Bird's Nest? — Child. Daisies — Sherman. Seven Times One — Ingelow. The Rock-a-By Lady — Field. All Things Beautiful — Alexander. Proverbs and Maxims.

2B

Don't Kill the Birds — Colesworthy. Ariel's Song, "Where the bee sucks." — Shakspere. My Shadow — Stevenson. Dutch Lullaby — Field. Windy Nights — Stevenson. Lady Moon — Houghton. Stop, Stop, Pretty Water — Follen. The Land of Story Books — Stevenson. Thanksgiving Day — Child. Proverbs and Maxims.

3A

I Live for Those Who Love Me — Anon. The Brown Thrush — Larcom. The Tree — Bjornsen. Wishing — Allingham. The Owl and the Pussy Cat — Lear. The Violet — Jane Taylor. Hiawatha's Childhood — Longfellow. Hiawatha's Sailing — Longfellow. Proverbs and Maxims.

3B

The Child's World — Lilliput Lectures. Marjorie's Almanac — Aldrich. A Visit from St. Nicholas — Moore. The Owl — Tennyson. The Captain's Daughter — Field. Sweet and Low — Tennyson. Proverbs and Maxims.

4A

The Night Wind — Field. The Children's Hour — Longfellow. Jack Frost — Gould. Robert of Lincoln — Bryant. "He Prayeth Best" — Coleridge. The Wreck of the Hesperus — Longfellow.

4B

The Fountain — Lowell. September — Jackson. The Village Blacksmith — Longfellow. The Mountain and the Squirrel — Emerson. Barefoot Boy — Whittier.

Drill exercises, as in 4A.

5A

The Landing of the Pilgrims — Hemans. The Day Is Done — Longfellow. "Under the Greenwood Tree" — Shakspere. A Sea Dirge — Shakspere. Woodman, Spare That Tree — Morris. The Gladness of Nature — Bryant. Excelsior — Longfellow. The Arrow and the Song — Longfellow.

5B

The World Wants Men — Anon. Aladdin — Lowell. Psalm of Life — Longfellow. To the Fringed Gentian — Bryant. The Planting of the Apple-Tree — Bryant. Paul Revere's Ride — Longfellow. Barbara Frietchie — Whittier. Today — Carlyle.

6A

Orpheus with His Lute — Shakspere. The Destruction of Sennacherib — Byron. A Man's a Man for A' That — Burns. The Minstrel Boy — Moore. Abou Ben Adhem — Hunt. The First Snow-Fall — Lowell. Nobility — Cary. Sheridan's Ride — Read. Song of Marion's Men — Bryant.

6B

The Spacious Firmament — Addison. Burial of Sir John Moore — Wolfe. The Builders — Longfellow. Old Ironsides — Holmes. One by One — Proctor. "Breathes there the Man" — Scott. The Blue and the Gray — Finch. The White-Footed Deer — Bryant.

7A

Fiftieth Birthday of Agassiz — Longfellow. To a Waterfowl — Bryant. The Finding of the Lyre — Lowell. The Year's at the Spring — Browning. "It is not growing like a tree" — Jonson. Daybreak — Longfellow. Bannockburn — Burns.

7B

Thanatopsis — Bryant. Charge of the Light Brigade — Tennyson. Hohenlinden — Campbell. "Good name in man and woman" — Shakspere. "Farewell, along farewell to all my greatness" — Shakspere. The Bugle Song — Tennyson. "There was a sound of revelry" — Byron.

8A

"Thou, too, sail on" — Longfellow. "The quality of mercy" — Shakspere. The Chambered Nautilus —

Holmes. My Heart Leaps Up — Wordsworth. The Brook — Tennyson. Sound the Loud Timbrel — Moore "I wandered lonely" — Wordsworth. The Concord Hymn — Emerson. Opportunity — Sill. Warren's Address — Pierpont. Bunker Hill Oration — Webster. Polonius's Advice — Shakspere.

8B

Liberty and Union — Webster. To a Skylark — Shelley. Elegy — Gray. The Forest Hymn — Bryant. Commemoration Ode (Division VI.) — Lowell. On His Blindness — Milton. The Way to Heaven — Holland. Sandalphon — Longfellow. "This was the noblest Roman of them all" — Shakspere. Gettysburg Address — Lincoln. "What is so rare as a day in June" — Lowell.

CHAPTER XV

ARITHMETIC

624. Changing points of view. — During the last ten years the teaching of mathematics has had more vigorous and authoritative discussion than any other subject in the elementary schools. The investigative efforts have produced a new psychology of number and new conceptions of methods, reconstructed text-books representing new types in content and arrangement, and established public recognition of the pertinent value of the history of mathematics. When we consider that arithmetic was co-existent with the needs of man, it is surprising that evidence of systematic reconstruction is not found in the earlier epochs of intellectual activity. But regrets are needless since students are privileged to share the benefits of modern scholarship. For references, see list of books at the end of this chapter.

625. Quantity, measurement, mathematics. — One notable feature of the new conception of mathematics is the close relation of arithmetic to life. This relation has always existed, but it has not been recognized in theory and application. The fundamental idea in each of the three topic headings in this section is found in the needs and limitations of mankind. Our wants are many, but provision for their supply is limited and secured only by labor. Time and energy are limited. It comes about, consequently, that the question *how*

much enters largely into life. How much do I need? How much can I get? How much of my time shall I give to this portion of my task, and how much to that? How much is mine? How much is yours? These and a thousand other similar questions are very insistent. Success in life depends largely upon the wisdom and accuracy with which we answer them.

A more specific illustration of this quantitative side of life is found in the historic experiences of the race. Take the pioneer farmer's problem, for instance. Land must be cleared and plowed and planted. The crop must be cultivated and harvested, a barn to store the grain and a shelter for family and stock must be built. Many other tasks must be performed. All these are essential parts of his one great task. Not one can be neglected, but almost any one might absorb all of his time and energy. He might build so large as to have no time for other things. He might clear so much land as to have no time left for plowing and so on. He must decide how much time he can give to any one part of his task and yet do justice to all the rest. In each separate task he must decide how much to undertake so that he may finish the task in its allotment of time. All this is true under the primitive conditions; and as social organization develops, the question *how much* becomes far more insistent and frequent.

Definitions

That aspect or property of the outside world that presses upon us the question *how much* may be thought of as quantity.

The process of determining the answer to the question *how much* is measurement. It is not always or gen-

erally a simple process of laying off a unit. That is, of course, always involved, but the entire process generally involves also considerable computation guided by knowledge of geometrical or physical laws.

The science of quantity is mathematics; and, therefore, mathematics is the science that treats of measurement and all the geometric and physical laws that measurement involves, and the application of those laws in computation, as well as the art of computation itself.

626. Definition of number. — The answer to the question of quantity, the result of the process of measurement, is number. This is identical with the definition found in many arithmetics: "Number is that which answers the question *how many* or *how much.*" The question *how much* always resolves itself into *how many,* according to *Psychology of Number*, page 71. Number is, then, that in which our ideas of quantity become definite.

The following definition regards the origin as well as the use of number: Number is a product of the way in which the mind deals with objects in the operation of making a vague whole definite. — *McLellan and Dewey*, page 32.

Note that this definition considers the concept of number as the result of a mental process showing quantity.

Other Approved Definitions

1. A number is that which is applied to a unit to express the comparative magnitude of a quantity of the same kind as the unit. — Glashan, *Arithmetic for High Schools.*

2. Number is the abstract ratio of one quantity to another of the same kind. — *Newton.*

3. Number is the ratio of one quantity to another quantity taken as a unit. — *Euler.*

Disapproved Definitions

1. "Number is a symbol." Entirely abstract; wrong, not in the mind.

2. "Number is identical with things; it is a property of objects." Wrong, as concept of number can exist only in the mind. It is because objects have been used to develop the idea of number that these definitions have been used. While we put number into objects, we derive our idea of number from the objects themselves.

3. "Number is a collection of units." Smith, page 100, says this definition is "scientifically worthless." But some educators hold that the first number concept is a collection of units, the ratio idea not developing clearly until later. This definition as quoted does, of course, exclude one as a number.

Conclusion

The consensus of opinion favors the definitions making number identical with ratio.

The definition quoted from McLellan and Dewey is generally accepted. Another authoritative source is Smith's *The Teaching of Elementary Mathematics.* The quotations used by Smith on pages 99, 100, and 101 are serviceable here:

The notion of number is not the result of immediate sense-perception, but the product of reflection, of an activity of our minds. We cannot see nine. We can see nine horses, nine feet, nine dollars, etc., that is, we see the horses, the feet, the dollars, if they are presented to us; that there are exactly nine, however, we cannot

see. If we wish to know this we are forced to count the things; and since we usually do this with the help of our eyes, the idea has got abroad that we see number. — Fitzga, *Die natürliche Methode des Rechen-Unterrichtes in der Volks- und Bürgerschule*, I. *Theil, Wien*, 1898.

Number is generated in the mind by the sense-perception of a group of things supposed to be alike. — *Smith*, page 101.

A careful observation shows us, however, that there are no objects exactly alike; but by a mental operation of which we are quite unconscious, although it holds within itself the entire secret of mathematical abstraction, we take in objects which seem to be alike, rejecting for the time being their differences. Here is to be found the source of calculation. — Laisant, *La Mathématique*, pages 15, 18, 19, 31.

627. Counting and measuring. — There is much discussion about whether counting or measuring should come first in teaching number. Both are required, but the New York City course of study mentions counting first. This use of the term counting includes the four fundamental operations; the old notion of counting meant a mastery of the numbers 1, 2, 3, 4, etc., in a narrower sense. Measuring is simply a form of activity, a kind of reaction. It implies learning by doing; it is concrete; it is empirical; it should be definite work rather than educative play. Measuring stimulates interest if the pupil understands what he is doing when he is measuring; but he cannot have any definite concept of measurement until he counts by using some unit of measurement, such as foot, yard, pint, dime, etc. Hence, "all counting is measuring and all measuring is

counting," as is said in McLellan and Dewey's *Psychology of Number*, page 48; also in Smith's *The Teaching of Elementary Mathematics*, page 104. When we count books in a library, we *measure* the library; and we measure our weight by *counting* the number of pounds. Counting is measuring a magnitude composed of discernibly distinct units; measuring is a method of counting the units into which a magnitude, outwardly continuous, may conceivably be divided.

The difference between counting and measuring is that in ordinary counting we use an undefined unit, a kind of vague measurement; as, 10 apples, 5 books. This counting of 10 apples or 5 books becomes definite only when weight or value, *i.e.*, measure, is known. The two processes help each other toward the same object, determination of quantity.

628. Arithmetic and its aim. — Arithmetic is a Greek word meaning literally science of number, and that is its traditional definition. But the word is used by us to describe the mathematics of the elementary school course, which is necessarily much more and at the same time much less than the science of number. What we thus call arithmetic might more properly be called the elements of mathematics, since the elements of geometry and physics have as legitimate a place in it as number, although the number element is large as compared with other elements. The subject-matter of arithmetic must be mathematical operations, processes, principles; but the aim of arithmetic is not so much the mastery of those processes and principles, as their application to the problems of measurement in the world about us. That application means the mastery of our material surroundings, familiarity with the quantitative side of nature,

insight into the world we live in, and command over its resources. The authorities for this view are McMurry, page 19; Smith, Chapter II and page 89; Harris, in *Educational Review*, Vol. 9, page 231; Young, page 203, for statement of aim of teaching arithmetic.

The obvious aim is to give accuracy and facility in simple computations and a working knowledge of practical applications; but, as Young points out, the teacher who works for no other end will miss a thousand opportunities to invigorate the pupil's power of thought. All the practical usefulness of arithmetic can be attained without sacrificing its value in cultivating habits of observation and reflection.

The Scotch Education Department memorandum on Teaching Arithmetic in the first years states as the first aim of the teacher: The development of the pupils' interest and intelligence through the solving of concrete problems with a clear understanding of the processes involved; and, as the second aim, the gradual perfecting of the machinery for the manipulation of abstract numbers. It should be added that a definite aim is the most important thing connected with method. (*Smith*, pages 1 and 110.)

629. Utility of arithmetic. — It thus appears that "arithmetic is the indispensable first step toward all science of nature." "Historically it was the first tool of thought that man invented in the work of emancipating himself from thraldom to external forces." "It is a powerful instrument for the regulation of social intercourse." The utility of the subject of study that occupies this position is obvious, and nearly all nations have put special utilitarian value upon it. Smith points out that the utility of mathematics for the individual in

helping him to earn a living has been overrated. That is in a measure true, but it is also true that, in a larger sense, the utility of mathematics as a means of correlating the child with the world he is to live in cannot be overrated. For further discussion, see *Educational Value of Mathematics*, Frank A. Hill, *Ed. Rev.*, Vol. 9, page 349; also W. T. Harris, *Ed. Rev.*, Vol. 9, page 242.

630. Important historical facts. — The Roman notation was used in Europe during the classical times and up to the fifteenth century. That notation served clumsily and inadequately the purpose of recording number, but was of no use for assisting computation. For this latter purpose some form of the abacus, in which counters in different grooves represented units of the various decimal orders, was used. Thus, both the teaching of arithmetic and the method of computation were objective.

About 1500 A.D., the Hindoo, commonly called the Arabic, system was adopted. This furnished an ideal means of assisting computation, and teachers, perceiving that their objective devices were no longer needed for computation, supposed that the devices could be dispensed with altogether. Arithmetic came to be a thing of symbols exclusively, and so also did the teaching of arithmetic. The teaching of arithmetic became the inculcating of a vast body of rules for juggling with digits. This was the age of rhyming arithmetics. It was hoped that if the rules were turned into rhyme the pupils would more easily remember them.

Not until shortly before the beginning of the nineteenth century was there a return to a more rational system. The great reformer was Pestalozzi. He resolutely made sense-perception the basis of all number

work and insisted that arithmetic should not be a matter of rules and traditions, but a rational process from beginning to end. His reforms were bitterly assailed and opposed, and only partially adopted. The battle still goes on. Compare for example the radically different views of objective teaching in the early school years as given in the New York City Syllabus and the 1910 State Syllabus.

A brief summary of historical views shows that thinkers have been contributing point by point what some recent writers seem to consider entirely new. A grouping of these respective contributions gives the substance of modern ways of teaching. Consult Smith for full presentation.

1. Busse. Number pictures: number cards of today.
2. Pestalozzi. Observation = perception.

(*a*) Know numbers rather than figures.

(*b*) Objective presentation; remove objects before drill.

(*c*) Much oral abstract drill.

3. Tillich. Special blocks: ratio. See Speer method.
4. Kranckes. Concentric circles. 10, 100, etc. Spiral methods.
5. Grube, 1842. All processes simultaneous. 1 to 10 first year.
6. Tank and Knilling; counting.

(*a*) Numbers needed for counting.

(*b*) Use number series. 2468, etc.; count objects, then memorize.

(*c*) Counting is basis of all elementary operations.

7. German spiral method based on concentric circles.
8. Arithmetic in rhyme.
9. All arithmetic based upon measurement of lines.

10. All arithmetic based upon paper folding.

11. Rein. Correlation.

(*a*) Familiar objects in home, nature study, literature, etc.

(*b*) Series and method units.

(*c*) Formal steps of instruction.

631. Method in arithmetic. — It would be impossible to form one composite method from the various lines of thought in mathematics. There is no unified historic development. We must look to recent psychological conclusions, as stated in the first section of this chapter. Four opinions will help to strengthen the opinion on general method as expressed in Chapter VIII.

1. There is no subject taught in the elementary schools that taxes the teacher's resources as to methods and devices to a greater extent than arithmetic. There is no subject taught that is more dangerous to the pupil in the way of deadening his mind and arresting its development if bad methods are used. —W . T. Harris *in Editor's Preface to the Psychology of Number.*

2. "Sound methods are methods that capture the interest, supply the will with motives, enlist the reasoning powers, favor original thought, and put the student on his intellectual mettle." "The methods need to be so graded as to give the student the consciousness of power." — F. A. Hill, *Ed. Rev.*, Vol. 9, page 350.

The problem of method is always the same: — to interest the pupil, to induce research, to continually give him the notion, the illusion if you will that he is discovering for himself the things that are being taught him. — *M. Laisant*, quoted by Smith, page 109.

Enough has been said to show that one of the easiest things in the teaching of arithmetic is the creation of

"Method" — and one of the most useless. We may start off upon the idea that all number is measure, and hence that arithmetic must consist of measuring everything in sight — and we have a "Measuring Method." It will be a narrow idea; we shall neglect much that is important; but if we put energy back of it we shall attract attention and will very likely turn out better computers than a poor teacher will who is wise enough to have no "Method," in this narrow sense of the term. Again, we may say that every number is a fraction, the numerator being an integral multiple of the denominator in the case of whole numbers. From this assumption we may proceed to teach arithmetic only as the science of fractions. It will be hard work, but, given enough energy and patience and skill, the children will survive it and will learn more of arithmetic than may be the case with listless teaching on a better plan. We might also start with the idea that every lesson should be a unit, and that in it should come every process of arithmetic, so far as this is possible, and we could stir up a good deal of interest in our "Unit Method." Or, again, we could begin with the idea that all action demands reaction, and that every lesson containing addition should also contain subtraction; that $6 + 4 = 10$ should be followed by $10 - 6 = 4$ and $10 - 4 = 6$; and that $2 \times 5 = 10$ should be followed by $10 \div 2 = 5$ and $10 \div 5 = 2$. By sufficient ingenuity a very taking scheme could be evolved, and the "Inverse Method" would begin to make a brief stir in the world. This in fact has been the genesis, rise, and decline of Methods; given a strong but narrow-minded personality, with some little idea such as those above mentioned; this idea is exploited as a panacea; it creates some little stir

in circles more or less local; it is tried in a greater or less number of schools; the author and his pupils die, and in due time the Method is remembered, if at all, only by some inscription in those pedagogical graveyards known as histories of education. — Smith, Monograph on *The Teaching of Arithmetic*, 1909, page 23.

632. Methods of teaching the concept of number. — It is unnecessary to outline in detail the first steps in teaching pupils to count. Most pupils have a concept of number long before they enter school; all they need is drill in wider application of their knowledge. Some teachers use splints in this drill; others use pencils, rulers, books, or the pupils themselves. The various devices are outlined in the next section, but through all the variety runs the uniform principle of *concrete presentation.*

The first idea of number is never abstract. Slowly through the years of experience the mental process of abstraction produces the abstract concept of number. Four suggestions for concrete teaching are mentioned in the course of study.

1. Scoring. This is simply a way of indicating the early impressions of number. The Arabic numerals are not so easily made as groups of vertical lines, thus:

1	2	3	4
/	//	///	////

The drawing of such vertical lines to represent numbers is called scoring.

2. By measurements and comparisons. Actual use of pint and quart, five-cent piece and dime. Comparison of groups of objects.

3. Use of toy money in business operations.

4. Use types in concrete problems. Here are the suggestive types:

(1) If there are 3 apples in one group and 2 apples in another, how many apples are there in both?

(2) If 3 apples are taken out of a group of 5 apples, how many apples remain?

(3) If there are 2 plants in a row, how many plants are there in 3 equal rows?

(4) If 2 plants are placed in a row, how many such rows are required for 6 plants?

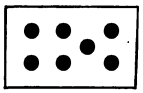
(5) If 6 plants are placed in 3 equal rows, how many plants are there in each row?

"Exercises in counting should aid in column addition and in a mastery of the multiplication tables. Comparisons and objective measurements should lead primarily to thought, rather than to over-much figure work. Oral work should precede and accompany all written work in every mathematical operation. Small numbers should be used in the illustration of principles."

The counting in the first term is limited to counting by 1's to 200, and 10's to 100. Later the pupils receive much drill in counting forwards and backwards by 2's, 3's, 4's, 5's, etc. This is the process that gives the foundation for the tables in the four fundamental operations. This paragraph relates to New York City practice.

633. Concrete number operations, order of succession. — We quote from the *Scotch Memorandum*. "The pupil must first learn the sequence of names in the number series, and be able to count a succession of objects one at a time. He should then be taught by concrete examples to perform the four operations with small whole numbers which may be slowly increased in

magnitude as he advances. In addition to ordinary objects employed at this stage of the instruction it is useful to associate small numbers with geometrical forms, such as are seen on cards or dominos, as these forms not only give a picture of the number itself, but show the various ways in which it is made up." *E.g.*, notice that in the form we have pictured all the



possible ways in which seven can be made up. "The common units of every-day life should be gradually introduced; *e.g.*, the money units, the units of time, of length, of weight. The pupil should handle the coins and know their value. The clock should be used for the units of time. The units of weight should be used practically until the pupil has a clear idea of each unit and can give a fair estimate of a length or weight without actual measuring or weighing except to correct or verify his estimate. The units so introduced will give scope for the application of the four rules to problems of an every-day type."

634. Summary of modes of concrete number operations. — Notice that both measuring and counting are used in each of the devices in this summary.

1. Counting visible objects, as chairs, birds, houses, children, apples, etc.

2. Other objects, as tooth-picks, buttons, beads, pencils, fingers, etc.

3. The abacus, cubes, blocks, squares, etc.

4. Demonstrative devices, as distribution of papers, books, the marking off of positions at board, the paging

of books, counting time on the clock, attendance records, thermometer; in home geography, counting houses, making maps, etc.

5. Standard units, as gallon, pound, dollar, bushel, barrel, day, dozen, cubic foot, etc. Variety, practical units, ratios, and fractions from use of these.

6. Number pictures made of dots, lines, etc.; dominoes.

7. In decimal scale, splints or tooth-picks in bundles of 10's and 100's.

635. The use of a book by pupils. — The safe rule for the time of introducing a text-book in any subject is this: A book should be introduced as soon as children are able to use it to their own advantage. The average child is not capable of reading well during the first term of school life and so there is little or no advantage for him in trying to use a text-book in arithmetic. For this reason, the work of the first term is largely oral, but as soon as the child is able to make any use of a text-book in arithmetic he should be given that privilege. The work in mathematics should not depend largely upon the hearing; it is another instance of multiple sense instruction. The interpretation of a printed problem requires more mental effort than the interpretation of a problem written on the board or dictated by the teacher. In the last two ways the pupil depends upon the assistance from the teacher.

Devices for Drill in Primary Grades

636. A distinction repeated. — All these suggested devices are only different ways in method; they are not methods in arithmetic. Devices of any kind are intended to attract and maintain attention. Curiosity,

competition, and success are likely to secure interest. Different devices satisfy a desire for variety, and some of these have permanent value in being ready for use at any time. It is understood, of course, that these devices cover all the four fundamental operations — addition, subtraction, multiplication, and division.

637. Cards. — Number cards having the combinations on both sides of the card.

638. Charts. — Charts made with rubber pen. Figures large enough to be seen from any part of room.

639. Mimeograph work. — Copies made by mimeograph admit many uses. Some copies may contain the same work for the whole class; other copies may have a few additional problems for the faster workers; a third kind may have different work for each pupil.

640. Text-books. — A good text-book — no other kind should be used — has scores of examples suited to drill purposes. Use the book. Teachers may now secure separate books for each grade, and these are excellent supplements to the class text-book.

641. Board. — Special work on the blackboard. The advantage is the probability of satisfying the exact needs of the class by adaptation; the disadvantages are temporary use and eye-strain. Every class has some pupils who cannot easily read blackboard work.

642. Circle. — Figures outside circumference; number in centre.

643. Square. — Similar to arrangement in 642.

644. Drawing. — Two vertical lines crossing two horizontal lines at right angles, giving places for nine figures. Vertical, horizontal, and diagonal drill.

645. Dictation. — Dictation under limited time for answers.

646. Competition. — Competition under recorded time after definite assignment of work.

647. Decimation. — This device uses ten as a basis in each of the four fundamental operations. Following is a table in counting:

0	1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29

Build to

100 101 102 103 104 105 106 107 108 109

and then drill down and up.

Decimations in Combinations

0 + 1 = 1	7 + 8 = 15	9 + 4 = 13
10 + 1 = 11	17 + 8 = 25	19 + 4 = 23
20 + 1 = 21	27 + 8 = 35	29 + 4 = 33
30 + 1 = 31	37 + 8 = 45	39 + 4 = 43
40 + 1 = 41	47 + 8 = 55	49 + 4 = 53
etc.	etc.	etc.

Subtraction	*Multiplication*
99 − 6 = 93	3 × 6 = 18
89 − 6 = 83	3 × 16 = 48
79 − 6 = 73	3 × 26 = 78
69 − 6 = 63	3 × 36 = 108
59 − 6 = 53	3 × 46 = 138
etc.	etc.

648. How to mark papers. — This topic brings up the question in regard to marking what is right or what is wrong, and also the use of per cents, letters, or other means of indicating the worth of answers. Another question arises here, namely, if the answer is incorrect,

shall we allow anything for right methods of operation? In all problems accuracy is the first test of an answer. Answers are either right or wrong. The simple oral work cannot justly be marked upon any other basis. Later in the life of pupils it may be that the processes should be given some consideration, but the business demand for a correct answer is a criterion always to be kept in mind by the teacher. The use of letters or figures is a matter for individual decision.

649. The nature of the problems. — In speaking of the various kinds of elementary work we have insisted that the material should be adapted to the capacities of the pupils as well as to the needs of the course of study. These same principles apply in the primary arithmetic. Use problems that are adapted to the actual experience of the child. Such problems are the ones that produce interest at the same time that they give the requisite drill in the work. It is advisable to use problems that are related to the common forms of industry and other forms of life, but in the first grade it is probable that the interests of the children will require a simple presentation of experience in regard to games, toys, home life, etc., more than to the industrial phases of the community. Regarding the method of doing the work, both oral and written practice should be put into use as early as possible. Regarding abstract and concrete examples, both kinds should be used. Accuracy may result from using concrete problems alone, but rapidity can never be acquired without frequent drill on abstract numbers. Much of the work should, of course, be concrete, but as soon as the children are able to perform abstract number operations, a part of the daily drill should be devoted to rapid com-

putation in abstract work. A few minutes each day through all the grades should be set aside for oral computation. It is suggested that in the written work a time limit be set so that each child may be judged according to his recitation. It is not expected that all pupils will be able to solve the same number of problems in the limited time.

650. Opinions on drill. — Mechanical precision with abstract numbers can be accelerated, *without detriment to the intelligence*, by a well arranged summing up of the results already obtained in concrete cases. — *Scotch Memorandum.*

Teachers are seriously attempting at the present time to co-ordinate the interests of the children, the needs of society, and the mathematical powers in each of the grades from the first year through the elementary school. — Smith, Monograph on *The Teaching of Arithmetic*, page 17. See Young, page 131.

651. The fundamental operation. — The fundamental operation of arithmetic is counting. All other arithmetical operations are simply devices for speed by using remembered countings instead of going through the detailed. Herein is the hint furnished the teacher for the first lessons in arithmetic. Let the child construct gradually out of his countings his own tables of addition, subtraction, and multiplication, and fix them in his memory. — Harris, *Ed. Rev.*, Vol. 9, page 243.

652. Hint from experience of the race. — It is interesting to reflect that the concrete problems that they differentiate as addition, subtraction, multiplication, measurement, and partition, came to primitive man unclassified; and he solved them all by counting without realizing that they were of different classes. Take three

illustrations, the second and the third together being the inverse of the first.

1. If a wild savage chief wants to distribute 6 fresh-water clams apiece to 4 warriors, how many must he have to distribute?

2. If a chief wants to deal out 18 clams to as many as he can, giving 6 to each, how many will receive clams?

3. If he wishes to distribute 18 clams equally to 3 men, how many will each receive?

All of the intricacies and mysteries of measurement and partition are wrapped up in the last two problems, but the savage chiefs solved them all by counting, and so can the small boy. The practice is justified also by the culture epoch theory of education.

Addition

653. A kind of counting. — This is another application of counting. Some writers speak of addition as a synthesis of the elements of knowledge gained in the first number concepts. But addition is so closely related to the first work in counting that it is not necessary to try to set limits between the two kinds of mental operations. Counting by 1's is addition; and surely the counting by 2's, 3's, etc., is giving results in addition, whether called so or not.

The first addition tables are the combinations of numbers of one order with 1 and 2:

1	2	3	4	5	6	7	8	9	2	3	4	5	6	7	8	9
1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2

sums found by counting objects; the value of each number and of each combination, as 3 and 2 are 5, 2 and 3

are 5, should be recognized at sight without counting the combinations memorized.

A continuation of the drill in addition gives forty-five combinations of digits, taking two figures in each combination.

654. The forty-five combinations. — Following is the complete list as it is taught in the first two years of school:

1	2	3	4	5	6	7	8	9
1	1	1	1	1	1	1	1	1
	2	3	4	5	6	7	8	9
	2	2	2	2	2	2	2	2
		3	4	5	6	7	8	9
		3	3	3	3	3	3	3
			4	5	6	7	8	9
			4	4	4	4	4	4
				5	6	7	8	9
				5	5	5	5	5
					6	7	8	9
					6	6	6	6
						7	8	9
						7	7	7
							8	9
							8	8
								9
								9

655. Automatic habits. — After all of these combinations whose sum is 10 or less are thoroughly memorized,

and special attention has been given to the combinations making 10, then proceed as follows:

1. $10 + 1 = 11$, $10 + 2 = 12$, $10 + 3 = 13$, etc., to $10 + 10 = 20$.

2. Then in any such sum as $13 + 5$, proceed thus: $13 + 5 = 10 + 3 + 5 = 10 + 8$.

3. To pass from a number in the first decade to a number in the second decade, as $8 + 7$, proceed thus: $8 + 7 = 8 + 2 + 5 = 10 + 5 = 15$. Or after special attention has been given to series $6 + 6$, $7 + 7$, $8 + 8$, $9 + 9$, the following method may be used: $8 + 7 = 1 + 7 + 7 = 1 + 14 = 15$.

These are methods of using known combinations to discover new combinations in constructing the tables without taking the trouble to count up. A combination of methods is not only possible but desirable, as the ultimate aim is to suppress the intermediate and secure the result in one step automatically, which can be more easily effected if the intermediate step is variable. — *Scotch Memorandum.*

656. Two fundamental facts. — As soon as the sum of two numbers involves the process of "carrying," two fundamental facts must be taught:

1. Ten units make *one ten.*

2. *Place* gives value to a figure.

The practice in counting by 10's is a preparation for both these facts, and the drill on addition giving sums from 10 to 20 will impress the truth.

657. Decomposition. — When the sum is 20 or more, it may be helpfui to show units and tens by decomposition. This process is not approved by some educators, but it is inserted here for the use of those who wish to teach it.

1. 16 + 5 = ?
   16 = 1 ten + 6 units
   = 10 units + 6 units.

   Then 10 units
   + 6 units
   + 5 units
   21 units.

   16
   + 5
   21 ans.

2. 24 + 13 = ?
   24 = 2 tens + 4 units
   13 = 1 ten + 3 units.

   Then 20 units
   + 4 units
   + 10 units
   + 3 units
   37 units.

   24
   +13
   37 ans.

3. 87 + 36 = ? Now we meet the fact that *ten* tens make *one* hundred.

hundreds	tens	units
	8	7
	3	6
	11	13
1	2	3

87
+36
123 ans.

658. Algorisms. — This is a word relating to the form of work, *i.e.*, the arrangement. The column or vertical arrangement is preferred, since so much column addition is required in life. The psychological habit of vertical addition is, therefore, more important than the habit of horizontal addition. Both are combined for proof in the grammar grades. The proof of addition in the primary grades is made by reversing the order of adding. If the first process was from the bottom to the top, then for proof begin at the top and add down.

EQUATION. — The horizontal form of expressing an example in addition gives an equation, thus:

$$32 + 19 = 51.$$

In other words, the expression of equality in mathematics is an equation. The part before the sign of equality is

the first member; the part after the sign of equality is the second member. The equation is a kind of algorism.

659. Laws or principles of addition.

1. Only like numbers can be added.
2. The sum is the same in kind as the addends.
3. If the like orders of units be added separately, the sum is the sum of all the numbers added, since the whole is equal to the sum of all its parts.
4. If the sum of the units of any order contains units of a higher order, these higher units must be combined with units of like order.

Subtraction

660. Relation to addition. — As addition is considered synthesis in counting, subtraction is analysis in counting. Addition and subtraction may be taught together, using subtraction as the inverse of addition. Sticks, pencils, and other concrete devices are used as material, and the child measures the difference in the groups by counting. Considerable facility in rapid subtraction should be secured in the easy combinations before introducing the necessity of "borrowing." Decomposition will be used again to explain the relations of units, tens, and hundreds in subtraction. It is only one step from the known process in addition.

661. Decomposition to explain borrowing.

$35 - 18 = ?$

$35 = 3 \text{ tens} + 5 \text{ units} = 30 + 5 = 35$

$= 2 \text{ tens} + 15 \text{ units} = 20 + 15 = 35$

$18 = 1 \text{ ten} + 8 \text{ units} = 10 + 8 = 18$

$1 \text{ ten} + 7 \text{ units} = 10 + 7 = 17$

$$\begin{array}{r} 35 \\ -\ 18 \\ \hline 17 \text{ ans.} \end{array}$$

662. Equal addition to explain borrowing. — A few years ago the method of equal additions was widely used among the disciples of Pestalozzian number. It is not used much today, although the axiom still holds; namely, If equal numbers be added to unequal numbers, the difference between the unequal numbers remains unchanged.

$35 - 18 = ?$ Or $\begin{array}{r} 35 \\ -\ 18 \\ \hline \end{array}$

$35 + 10 = 3 \text{ tens} + 15 \text{ units} = 30 + 15 = 45$
$18 + 10 = 2 \text{ tens} + 8 \text{ units} = 20 + 8 = 28$
$1 \text{ ten} + 7 \text{ units} = 10 + 7 = 17$

$\begin{array}{r} 35 \\ -18 \\ \hline \end{array}$

$35 - 18 = 17$ ans. Or 17 ans.

This operation has combined the use of decomposition with equal additions to make the number of units in the minuend greater than the number of units in the subtrahend.

663. Complementary addition in subtraction. — This method is an application of addition, thus:

$$\begin{array}{r} 764 \\ -\ 478 \\ \hline 286 \text{ ans.} \end{array}$$

Instead of saying 8 from 14, we observe that 6 added to 8 will make 14, and the process becomes

$$8 + 6 = 14,\ 8 + 8 = 16,\ 5 + 2 = 7.$$

This method is mentioned by Smith in the next paragraph.

664. Four ways of performing subtraction. — In subtracting 297 from 546, we have the two old plans, both dating from the time of the earliest printed text-books, at least.

$$\begin{array}{r} 546 \\ 297 \\ \hline 249 \end{array}$$

The calculation is substantially this:

(1) 7 from 16, 9; 9 from 13, 4; 2 from 4, 2; or

(2) 7 from 16, 9; 10 from 14, 4; 3 from 5, 2.

But we have also a more recent plan:

(3) 7 and 9, 16; 10 and 4, 14; 3 and 2, 5.

To this might be added a fourth plan, which has some advocates:

(4) 7 from 10, 3; 3 and 6, 9; 9 from 10, 1; 1 and 3, 4; 2 from 4, 2.

All four of these plans are easily explained, the first rather more easily than the others. But the third has the great advantage of using only the addition table in both addition and subtraction, and of saving much time in the operation. It is the so-called "Austrian method" of subtraction. The fourth plan, while a very old one and possessed of some good features, is so ill adapted to practical work as to have no place in the school. It is hardly necessary to say that the old expressions "borrow" and "carry" in subtraction and addition are rapidly going out of use; they were necessary in the old days of arbitrary rules, but they have no advocates of any prominence today. — Smith, *The Teaching of Elementary Mathematics*, page 121.

665. Principles of subtraction.

1. Only like numbers can be subtracted.

2. If the units of each order in the subtrahend be taken separately from the units of like order in the minuend, the sum of the differences equals the entire

difference of the given numbers. Axiom: The whole equals the sum of all its parts.

3. If both minuend and subtrahend be equally increased the difference will not be changed.

666. Proof of subtraction. — Add difference and subtrahend; or subtract difference from minuend to get subtrahend; or cast out 9's.

Multiplication

667. Special case of addition. — This process is treated as synthesis in taking one number a certain number of times. Multiplication is a short form of addition, or, more strictly speaking, is a special case of addition, namely, that in which the several addends are equal; and in which consequently another memory device, namely the multiplication table, is possible.

668. Counting. — For first steps, arrange and count concrete objects as in addition and subtraction.

669. Decomposition. — Use decomposition again to explain multiplication by one figure.

$$\begin{array}{r} 28 \\ 3\times \\ \hline \end{array} \qquad \begin{array}{r} 28 = 20 + 8 \\ 20\times\ 3 = 60 \\ 8\times\ 3 = 24 \\ \hline 28\times\ 3 = 84 \end{array}$$

Decomposition to explain multiplication by two figures.

$$\begin{array}{r} 67 \\ 23\times \\ \hline \end{array} \qquad \begin{array}{r} 67\times\ 3 = 201 \\ 67\times 20 = 1340 \\ \hline 67\times 23 = 1541 \end{array}$$

This work may be arranged in another form:

Multiplying by 3 units we have 201 units; multiplying by 20 units we have 1340 units. The sum of these partial products is 1541 units.

Since 1340 units = 134 tens, we omit the cipher, and write 134 as tens. This shorter process gives the final form.

$$\begin{array}{r} 67 \\ 23\times \\ \hline 201 \\ 1340 \\ \hline 1541 \end{array}$$

thousands	hundreds	tens	units
		6	7
		2	3 ×
	2	0	1
1	3	4	
1	5	4	1

670. Justification. — These three examples are justified by the third principle of multiplication in section 675, or rather by a principle of which that third principle is a special case, namely, that the product of a number by the sum of two other numbers is equal to the sum of the products obtained by multiplying that number by each of those numbers separately. This is the distributive law of multiplication, and is an axiom or a fundamental assumption verified by all experience. It is useful, in impressing this truth, to multiply by 20 first. The method is just as easily grasped by the small child. It impresses the fact that in multiplying 67 by 23 we are multiplying by 20 and by 3. It has the advantage of doing the most important part of the work first — a procedure that is always commendable. In fact, the method is insisted on for the last named reason in Elson and Short's *First Book in Mathematics* just published by Heath.

$$\begin{array}{r} 67 \\ 23\times \\ \hline 1340 \\ 201 \\ \hline 1541 \end{array}$$

671. Multiplication by factors. — Variety is one advantage, a means of proof is another, and a practice in analysis of numbers is a third. Another justification is the associative law of multiplication. This process illustrates the law: $3546 \times 24 = (3546 \times 6) \times 4 = (3546 \times 4) \times 6 = 3546 \times (4 \times 6)$. This is another important law which may be regarded as axiomatic in character and a fundamental law of the science of number.

$$\begin{array}{r} 3546 \\ \times\ 24 \\ \hline 3546 \\ \times\ 6 \\ \hline 21276 \\ \times\ 4 \\ \hline 85104 \end{array}$$

672. Justification by commutative law. — The commutative law is equally important and good for variety, for proof, and for knowledge of the properties of number. According to the first principle in section 675, the multiplicand and multiplier may be interchanged.

$$\begin{array}{r} 67 \\ 23\times \\ \hline 201 \\ 1340 \\ \hline 1541 \end{array} \qquad \begin{array}{r} 23 \\ 67\times \\ \hline 161 \\ 138 \\ \hline 1541 \end{array}$$

673. Commutation, association, and distribution. — A statement of the three laws may be helpful to some students. The laws relate to arrangement and analysis of numbers.

The law of commutation says the product is the same, independent of the order in which the numbers are multiplied.

$$5 \times 6 \times 7 = 7 \times 6 \times 5 = 6 \times 7 \times 5.$$

Likewise in addition.

$$5 + 6 + 7 = 7 + 6 + 5 = 6 + 7 + 5.$$

The law of association, applied to multiplication, says that the use of brackets makes no difference in the process.

$$2 \times 3 \times 5 = 6 \times 5 = 10 \times 3 = 15 \times 2.$$

But the use of brackets in combined addition and subtraction does make a difference.

$$5 + 6 \times 7 = 47$$
$$(5 + 6) \times 7 = 77.$$

The law of distribution uses analysis by a kind of decomposition of numbers.

$$5 = 2 + 3.$$

Then $$4 \times 5 = 4 \times 2 + 4 \times 3 = 20.$$

$$a(b + c) = ab + ac.$$

The product of the sum of two numbers by a third equals the sum of the products of the numbers by the third number separately.

$$3(5 + 4) = 3 \times 9 = 3 \times 5 + 3 \times 4.$$

The important application is

$$25 \times 33 = 25 \times 3 + 25 \times 30.$$

674. Multiplication tables: mode and order of learning. — Learning these tables by the memory process alone is condemned. All the work in counting by 1's, 2's, 3's, etc., is a preliminary preparation. The combinations in the four operations are another aid; and then the *use* of acquired knowledge in measuring with foot-rule, yard-stick, toy money, pints, quarts, etc. — all help the pupils to construct the tables out of personal experience in counting and measuring.

The order of learning the tables is not that of the old books. An easy order is as follows: 10's, 2's, 5's, 4's, 8's, 3's, 6's, 9's, 7's. This order starts with 10's as the easiest; then the 2's are not difficult; the 5's easily unite with the 10's and the 2's; so, too, the 4's and the 8's, and then 3's, 6's, and 9's. The 7's are not closely related with any other table; but by leaving the 7's till the last, all the combinations in the 7's are then covered by

the other tables. Other opinions favor a different order of procedure, but McMurry upholds this one.

675. Principles of multiplication. — When either factor contains more than one figure, the principles are as follows:

1. The product is the same, whichever factor is used as multiplier.

2. If one factor be units of the first order, the product will be the same in kind as the other factor.

3. If units of each order in the multiplicand be taken separately as many times as there are units in the multiplier, the sum of the products equals the entire product of the given numbers.

676. Proof of multiplication. — Divide product by multiplier to get multiplicand; or invert order of factors and multiply; or cast out 9's.

677. Concrete and abstract numbers in multiplication. — This is the place for discussion of terms concrete number and abstract number. A concrete number is a number with the name of the unit designated. Multiplicand may be either concrete or abstract, but multiplier must be abstract. Even if multiplicand is abstract, the multiplicand and multiplier must be different kinds of numbers, *i.e.*, refer to units of different sorts; the multiplicand refers to units of some sort, though the sort is not designated, and the multiplier to units not of the same sort, but to repetitions of the group represented by the multiplicand.

Illustration

If 3 pencils cost 2 cents apiece, how much will the 3 cost? Answer, 3 times 2 cents. Is it 3 pencils times 2 cents? Absurd; not 3 pencils times 2 cents,

but 3 times 2 cents, because the 2 cents must be repeated as many times as there are pencils.

Even in concrete problems, such as that just discussed, multiplication is commutative as is shown by the following analysis. If the 3 pencils had cost 1 cent apiece, the 3 would have cost 3 cents; but, since each costs 2 times 1 cent, the three will cost 2 times 3 cents. It appears, then, that multiplier and multiplicand may be interchanged, but that the multiplier in becoming multiplicand takes on the concrete character of cents and the multiplicand in becoming multiplier loses its concrete character and becomes times.

Division

678. Nature of division. — An analytic process, the inverse of multiplication; *i.e.*, the process of finding one factor when product and the other factor are given. Division may also be regarded as repeated subtraction of divisor from dividend.

679. Measurement and partition. — In speaking of product in the preceding paragraph, product is the dividend and the known factor may be either multiplicand or multiplier. As emphasized in section 677, the multiplicand is presumably concrete, the multiplier always abstract, and at any rate numbers referring to different kinds of units. Arising from these conditions, two cases of division may be distinguished: (1) measurement, or that in which a number, the multiplicand, is repeated in a number of the same sort, the product, and in which the problem is to find how many times, the multiplier; (2) partition, or that in which the number of times is given, and the problem is to find the multi-

plicand. The first case is like physical measurement and hence the name.

In the second case, partition, if the operations were to be performed actually instead of symbolically it would be seen to be measurement after all. Distribute 52 cards to four people and find size of each pile. The problem is of course to find one-fourth of 52, *i.e.*, partition, but the method is to deal a card to each of the four people and then determine how many times this process of dealing out four cards from the 52 can be repeated, which process is evidently measurement. Hence, McLellan and Dewey contend very strenuously that there is no such thing in arithmetic as partition. (*Psychology of Number*, page 123.)

680. Short division. — Short division is only the inverse of the combinations in multiplication.

Long division. — Long division by decomposition (distributive law).

$684 \div 2 = ?$	
$600 \div 2 =$	300
$80 \div 2 =$	40
$4 \div 2 =$	2
$684 \div 2 =$	342 ans.

Other forms.

```
2)684(342
  6
  8
  8
  4
  4
```

```
  342
2)684
  6
  8
  8
  4
  4
```

A more difficult example.

We say 674 = 6 hundreds, 7 tens, 4 units. 6 hundreds ÷ 2 = 3 hundreds. Bring down 7 tens; 7 tens ÷ 2 = 3 tens and 1 ten remaining. 1 ten and 4 units = 14 units; 14 units ÷ 2 = 7 units. The quotient is 3 hundreds, 3 tens, 7 units, or 337.

```
2)674(337
  6
  7
  6
 14
 14
  0
```

681. Division by factors (associative law).

3864 ÷ 24 = ?

```
4)3864
6)966
  161 ans.
```

682. Laws or principles of division.

1. Dividing a number by one of its factors gives the other factor.

2. When the divisor is an abstract number, the quotient and the dividend are like numbers.

3. When the dividend and the divisor are like numbers, the quotient is abstract.

683. Proof of division. — To prove division, multiply quotient and divisor to reproduce dividend.

684. Grube method: characteristics, advantages. — The leading characteristic of this method is that it tries to teach the four fundamental processes with each number before the next number is taken up. It is an application of the old idea of teaching in "concentric circles." Advantages claimed: simplicity and thoroughness.

685. Objections to the Grube method.

1. A unit not a fixed thing. The natural beginning of number is a whole — needing measurement, while Grube says that one thing is the natural beginning.

2. Different processes are not equally difficult.
3. Free range among higher numbers excluded.
4. Synthetic only; memory drill.

These four objections are from McLellan and Dewey. The following are from Smith, page 91:

1. It carries objective illustration to an extreme, studying numbers by the aid of objects for three years, until 100 is reached.

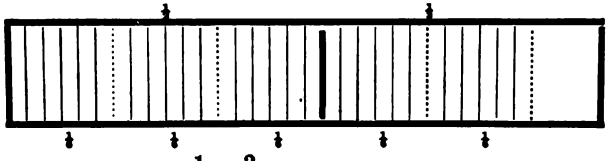
2. It attempts to master each number before taking up the next, as if it were a matter of importance to know the factors of 51 before the child knows anything of 75, or as if it were possible to keep children studying 4 when the majority know something of 8 before they enter school.

3. It attempts to treat the four processes simultaneously, as if they were of equal importance or of equal difficulty, which they are not.

686. Speer method. — This is an attempt to teach concretely that ratio is number. Judgments of relative magnitude are secured by using the type forms — cubes, prisms, etc. — in getting the concept of number. Criticism: Not a direct use of materials in daily life; from complex to simple. It should be noted, however, that this method recognizes the acceptable ratio idea of number and attempts to introduce the ratio idea earlier than has been the case. Smith seems to favor this earlier introduction (page 105).

687. Graphic methods. — Graphic methods include all objective ways of aiding visualization, such as writing, drawing, pictures, cubes, etc. Technically, a graph is a line representing variations of temperature, price, population, class standings, etc.

Illustration. Add $\frac{1}{2}$ and $\frac{1}{3}$.



$$\frac{1}{2} = \frac{3}{6}$$

$$\frac{1}{3} = \frac{2}{6}$$

$$\frac{1}{2} + \frac{1}{3} = \frac{3+2}{6} = \frac{5}{6}.$$

Properties of Number for Primary Grades

688. Extent of work. — Certain properties of number are easily grasped by children of the earlier grades and may be profitably taught to them. The distinctions of odd and even numbers, and of prime and composite numbers, and the tests of divisibility by 2, 3, and 5, are of this class. Also definitions of factor, product, power, root.

689. Odd and even. — Study the numbers / // /// ////, etc. Which of them are capable of being grouped in pairs? Such are even, the rest are odd. What is the appropriateness of the names?

690. Prime and composite. — Represent the several numbers by scoring, as in the preceding section. Some of them, as 1, 2, 3, 5, 7, cannot be divided in any way into equal groups, but 4 (// //) may be divided into two groups of two each, 6 (/// ///) or (// // //) into two groups of three or three groups of two, 9 (/// /// ///) into three groups of three. Those of the first class we call prime, those of the second, composite numbers. What is the appropriateness of the names?

691. Divisibility. — State how to tell without dividing whether 2 will be exactly contained in a number? The answer is contained in the definition of even number as given in section 689. As it happens, these numbers always end in 2, 4, 6, 8, or 0.

Study the multiplication table of 5's and, noticing how the numbers all end, frame a statement telling what numbers are divisible by five. Verify.

Study the numbers 10, 11, 12, 13, 14, 15, 16, 17, 18. Which are divisible by 3. Is it also true that the sum of the digits of those numbers is divisible by 3? What is true in this respect of the other numbers? Make a general statement summarizing the observations. Verify.

Properties of Number for Higher Grades

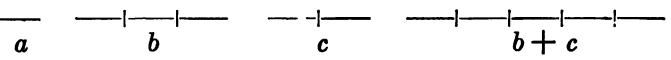
692. Induction and deduction. — The examples in the preceding section illustrate the application of the inductive method to the discovery of the principles of arithmetic, and at the same time show that the formal steps of instruction are simply the steps in inductive reasoning. It is well established that in the earlier years, at least, the principles of arithmetic should be arrived at inductively. But on the other hand, arithmetic (*i.e.*, the science or theory of number) may be treated as a purely deductive science, and in the later grades it is well to give the children some notion of that truth. Properties of number is a topic well adapted for that purpose.

693. Commutative, associative, and distributive laws. — See section 673.

694. Other general properties.

1. If a number is contained exactly in two numbers, it is contained exactly in their sum or difference.

This law is probably as nearly axiomatic as any law can be. The following will illustrate the necessary character of its truth:



If a is exactly contained in b and also in c it is evidently exactly in $b + c$.

2. If a number is exactly contained in another it is exactly contained in any multiple of that other number.

This is a corollary of number 1.

3. If a number exactly contains two numbers, prime to each other, it contains their product.

If 24 contains 3 and 4, it contains 12.

This rule is a corollary of the associative law of multiplication; because if 24 contains 3 and 4 and some other factor a, then $24 = 3 \times 4 \times a$. Therefore $24 = (3 \times 4)a$ by associative law.

These laws are general because they are true of numbers as such, while the tests of divisibility are true only for our particular system of notation. The whole body of principles of number may, moreover, be derived deductively from these general properties as geometry is derived from a few axioms and definitions.

695. References. — For more exhaustive treatment of the properties of number, see Chrystal's *Algebra* Part II, Chapter 35; any approved college algebra; *Encyclopedia Brit., Theory of Numbers.*

696. Application: tests of divisibility. — The tests of divisibility illustrate the application of the laws of properties of number as expressed in our decimal notation. A number is divisible

By 2, if it ends in 0, 2, 4, 6, 8.

By 3, if the sum of its digits is divisible by 3.

By 4, if the number represented by the two digits at the right is divisible by four.

By 5, if it ends in 0 or 5.

By 6, if divisible by 2 and by 3.

By 8, if the number represented by the three digits at the right is divisible by 8.

By 9, if the sum of its digits is divisible by 9.

By 10, if it ends in 0.

By 12, if it divisible by 3 and by 4.

By 7 and 11, actual division test.

697. Types of demonstration. — We may, as stated before, satisfy ourselves of the truth of these propositions by inductive study, but deductive demonstration is more satisfactory to the mature mind, because it not only satisfies us of the truth of the proposition but shows that the truth is a necessary logical consequence of more fundamental truths. For example, take tests of divisibility by 3 and 12.

698. Test by 3. — Let a, b, c, d, and e represent the digits of the number and assume that the sum of the digits $a + b + c + d + e$, *etc.*, is divisible by 3.

$a + 10b + 100c + 1000d +$ *etc.* represents the number.

Prove $a + 10b + 100c + 1000d +$ *etc.* is divisible by 3.

Proof: Syllogism 1

MAJOR PREMISE. If a number is contained in another number, it is contained in any multiple of that number.

MINOR PREMISE. 3 is evidently contained in 9, 99, 999, etc.

CONCLUSION. 3 is contained in $9b$, $99c$, $999d$, etc.

Syllogism 2

MAJOR PREMISE. If a number is contained in each of several numbers, it is contained in their sum.

MINOR PREMISE. 3, as just proved, is contained in $9b$, $99c$, $999d$, etc.

CONCLUSION. 3 is contained in $9b + 99c + 999d$, etc.

Syllogism 3

MAJOR PREMISE. If a number is contained in each of two numbers, it is contained in their sum.

MINOR PREMISE. 3 is contained in $a + b + c + d +$ etc., by hypothesis and in $9b + 99c + 999d +$ etc., as just proved.

CONCLUSION. 3 is contained in $a + 10b + 100c + 1000d +$ etc.

Test by 12. — A number is divisible by 12 if divisible by 3 and 4.

Proof: Syllogism

MAJOR PREMISE. If a number is divisible by each of two numbers, prime to each other, it is divisible by their product.

MINOR PREMISE. The number in question is divisible by 3 and 4, numbers prime to each other, by hypothesis.

CONCLUSION. The number is divisible by 12, the product of 3 and 4.

699. Frequent use of syllogism. — Aside from the specific illustrations just given, the syllogism is frequently used although students may not be conscious of using this form of reasoning. Bailey discusses this topic in the *N. E. A. Report*, 1905, page 384. He calls

the process of reasoning traduction. He says: "Three statements are involved. The major states the relation between the required term and the given term; the minor states that the given term is equivalent to a second term; and the conclusion makes the same statement involving the second term which the major premise makes involving the first term. The conclusion is valid, because, in any proposition, a term may be replaced by a second term, provided the second term is equivalent to the first."

Illustration. If 1 apple costs 3 cents, how much will 5 apples cost?

MAJOR. "The cost of 5 apples" is 5 times "the cost of 1 apple."

MINOR. "The cost of 1 apple" is "3 cents."

CONCLUSION. The cost of 5 apples is 5 times "3 cents."

It is customary to abbreviate the argument by the omission of one of the premises. In some localities, the major is omitted, giving the form: "Since the cost of 1 apple is 3 cents, the cost of 5 apples is 5 times 3 cents;" in others, the minor is omitted, giving the form: "Since the cost of 5 apples is 5 times the cost of 1 apple, the cost of 5 apples is 5 times 3 cents."

The argumentative power developed by analysis is strongly commended by Smith in his monograph of 1909, page 11.

Divisors

700. Common divisors and factors: highest common factor. — The terms, greatest common measure, highest common factor, greatest common divisor, are interchangeable, each preferable under certain conditions, the first preferable on the ground of its implied concreteness.

The definitions of the terms, factor, divisor, measure, common factor, greatest common measure, etc., are obvious, but it is very important to good teaching that they be insisted on and carefully elaborated. Ridiculous mistakes are committed because children and sometimes teachers do not reflect that the adjective common implies at least two things, and that a common factor is a factor of each of at least two numbers.

Finding Highest Common Factor

701. By observation. — Derive greatest common divisor directly from the definition; *e.g.*, 24 and 36.

List of exact divisors of 24 is 2, 3, 4, 6, 8, 12, 24; and that of 36 is 2, 3, 4, 6, 9, 12, 18, 36. Evidently 2, 3, 4, 6, and 12 are common divisors and 12 is evidently greatest common divisor.

This method of treatment is important because it applies and enforces the definitions and also because it is practically the method that we generally employ. We mentally go over the lists of common factors and select the greatest without taking the trouble to resort to any of the following methods.

702. By product of prime factors. — To find greatest common divisor, resolve each of the several numbers into prime factors and find product of the common prime factors.

1. We may lead to the discovery of the principle by inductive approach, thus:

Numbers	All the divisors	Prime factors	Common Prime factors	G. C. D.
24	2, 3, 4, 6, 8, 12, 24	2, 2, 2, 3	2, 2, 3	12
36	2, 3, 4, 6, 9, 12, 18, 36	2, 2, 3, 3		

From an inspection of all the divisors we perceive that 12 is the G. C. D.; from an inspection of the prime factors we perceive that 12 is the product of the common prime factors. We therefore infer that the G. C. D. is the product of common prime factors.

Here we have the steps of the Herbartian lesson — preparation, presentation, comparison and generalization. But the generalization rests on too slender a foundation; the generalization must be verified and widely applied.

2. The same law may be derived deductively from general properties of number as follows: We use here the usual arrangement of demonstration into statement and reason. The statement is the conclusion, reason the major premise, and the minor premise must be inferred from the context.

Statement 1. The product of the common prime factors of two or more numbers is exactly contained in each number.

Reason for 1. If a number contains each of two or more numbers prime to each other, it contains their product.

Statement 2. This product is the largest number contained in each and therefore the G. C. D.

Reason for 2. If there were a common divisor larger than this product, it would have to be either prime or composite. It could not be prime because this product contains all of the common prime factors. If composite, all of its factors would be common, but this product contains all of the common prime factors.

703. By continued division.—A third method, applicable when the divisors of the numbers cannot be readily found, is the method of continued division.

Divide larger by smaller, then the smaller by the

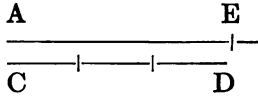
remainder and so on until a remainder is found that will be exactly contained in the preceding remainder. This last remainder is the G. C. D.

Find the G. C. D. of 849 and 1132.

849)1132(1 283 is G. C. D. of 849 and 1132.
849
283)849(3
849

Graphic Illustration

Find greatest common measure of lines AB and CD.



EB is greatest common measure of AB and CD.

Proof Statement 1. Greatest common measure of AB and CD will be contained also exactly in EB.

Reason for statement 1. If a quantity is exactly contained in each of two quantities, it is contained in their difference.

Statement 2. Therefore G. C. M. of AB and CD is not greater than EB.

Reason for 2. Evident because contained exactly in EB.

Statement 3. EB is exactly contained in CD.

Reason for 3. Found to be so by actual trial.

Statement 4. EB is therefore contained in AB.

Reason for 4. Being contained in AE (the equal of CD) and itself (EB) it must be contained in their sum.

Statement 5. Therefore EB is a common measure of AB and CD.

Reason for 5. Statements 3 and 4.

Statement 6. Therefore EB is G. C. M.

Reason for 6. It is a common measure and the G. C. M. is not greater. (Statement 2.)

This proof is an example of the truth that the deductive as well as the inductive method is capable of objective treatment. It is identical with Euclid's treatment in Prop. 2, Bk. VII (B.C. 300). Many educators eliminate this proof from both arithmetic and elementary algebra.

Multiples

704. Definitions. — A multiple of a number exactly contains that number. A common multiple of two or more numbers exactly contains each of the numbers. The least common multiple of two or more numbers is the least number that exactly contains each of the numbers.

Illustrations. The multiples of 6 are 6, 12, 24, 30, 36, etc. The multiples of 9 are 9, 18, 27, 36, etc. Select the common multiple of 6 and 9 and it will be L. C. M.

Finding Least Common Multiple

705. First method. — Find L. C. M. of several numbers by writing out the list of multiples of each, and then taking the first multiple common to the several numbers. This is the method of observation.

706. By multiplying prime factors. — The process of finding a multiple is simplified by finding the prime factors of each number and then multiplying those factors. The least common multiple is the product of the prime factors, each taken the greatest number of times it is found in any one of the numbers. This principle may be proved inductively and deductively.

1. Inductive proof. The prime factors of 6 are 2 and 3; of 9, 3 and 3. But we have already ascertained

that the L. C. M. is 18, which is evidently the product of the factors of 9 multiplied by 2, the factor of 3 not found in 9. Hence we assume the principle stated and proceed to verify it by other numbers.

2. Deductive proof. The principle may be shown to be a necessary logical consequence of the principle that if a number contains any number it contains each factor of that number.

707. Factoring by inspection. — This process follows easily as a result of knowing the combinations.

Find L. C. M. of 20, 30, and 70.

$$20 = 2 \times 2 \times 5$$
$$30 = 2 \times 3 \times 5$$
$$70 = 2 \times 5 \times 7$$

The factors common to all the numbers are 2 and 5. The factors not common to some of the numbers are 2, 3, and 7. Hence, according to the rule in 1, L. C. M. $= 2 \times 5 \times 2 \times 3 \times 7 = 420$.

708. Actual division. — Find L. C. M. of 15, 60, and 75.

5	15	60	75
3	3	12	15
2	1	4	5
		2	5

Hence, L. C. M. $= 5 \times 3 \times 2 \times 2 \times 5 = 300$.

709. By aid of G. C. D. — This way is used when the numbers are not easily factored by inspection.

1. Find greatest common divisor.

$$\begin{array}{r} 849)1132(1 \\ \underline{849} \\ 283)849(3 \\ \underline{849} \end{array}$$

2. Find other factors.

283	849	1132
	3	4

3. Multiply. $283 \times 3 \times 4 = 3396$ L. C. M.

Fractions

710. Common Fractions. — Familiarity with common fractions is a natural result of the gradual introduction of this work. Fractional parts are introduced during the first year in arithmetic, and then the passing from the known, ½, ⅓, ¼, etc., to the related unknown in larger fractions is going from the simple to the complex. Addition, subtraction, and division of fractions are best explained by reducing to common denominators. The method of common denominators may not be the usual one in division of fractions, but it is a logical step since the children become familiar with the meaning of common denominators in addition and subtraction. It may be needless repetition to say that all of the introductory practice in common fractions should be based upon the use of objects with which the children are familiar. It is more necessary because the symbol for the fraction is a clumsy, complicated affair, through which it is much more difficult to get hold of the concept of the fraction than through objective illustration.

In the fraction itself there is nothing more difficult than in the group. Five-tenths is as easy as five tens.

"The relations of magnitudes should, so far as possible, be represented to the eye. The fundamental operations should not only be performed symbolically by the digits, but practically, by joining lines together, dividing them into parts, and combining the parts in such a way as to illustrate the fundamental rules for

multiplication and division of fractions. A pupil can learn to divide a line into parts more easily than he can master definitions, and when this is done he has a conception of fractions which he cannot gain in any other way." (*Report of the Committee of Ten.*)

"It is essential in the first place to make it clear to the pupil that a fraction is the result of division into *equal* parts. It is convenient to employ the units already introduced, fractions of which can be expressed in terms of a smaller unit by means of whole numbers. For example, the foot gives halves, thirds, fourths, sixths, twelfths as so many inches; the hour (clock face) gives in addition fifths, fifteenths, twentieths, thirtieths, sixtieths, as so many minutes." (*Scotch Memorandum.*) From such concrete illustrations the pupil will get a grasp of the fraction and can easily pass to the symbol.

These suggestions supplement the advice in New York City: "Halves and fourths, thirds and sixths of single objects; paper folded into two equal parts, into four equal parts, into three equal parts, and into six equal parts; objects cut into two, into four, into three, and into six equal parts, and one or more of them named. The same should be illustrated by drawings."

Thus pupils have three ways of getting hold of the concept of fractions: the concrete objects divided into parts, the written words half, fourth, third, sixth, etc., and the symbols $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{6}$, etc.

711. Principles or laws of fractions. — There are three principles to be made clear in fractions. The teacher observes them at all times but pupils may know many of the processes before the rules are comprehended. These are the principles:

1. Multiplying or dividing both numerator and de-

nominator of a fraction by the same number does not change the value of the fraction.

2. Multiplying the numerator or dividing the denominator of a fraction by a number multiplies the fraction by that number.

3. Dividing the numerator or multiplying the denominator of a fraction by a number divides the fraction by that number.

These important principles may be developed and illustrated by these graphical means: $\frac{1}{2}$ ft. (6 in.) = $\frac{2}{4}$ ft. (*i.e.*, 2×3 in.) = $\frac{3}{6}$ ft. (*i.e.*, 3×2 in.) = $\frac{6}{12}$ ft. (*i.e.*, 6 in.). This gives the first principle. For the second: $\frac{1}{2}$ ft. = 6 times $\frac{1}{12}$ ft. (*i.e.*, 1 in.). Similarly for third principle.

712. Three conceptions of fractions. — Under a strict interpretation of number as measurement, the third conception embodies the first and the second, but the three classes are mentioned for the purpose of discussing what is set forth in the different text-books on arithmetic.

1. A fraction is one or more of the equal parts of a unit. This is the historic definition and the one still used in many books.

2. A fraction is indicated division. This is sometimes spoken of as the ratio of a quantity to another of the same kind. $\frac{3}{4}$ means $3 \div 4$. This means that 4, the divisor, is a unit of measure in terms of which 3 is to be expressed. $6 \div 2$ means that if 2 is the unit, what is 6? So also $3 \div 4$ means that if 4 is the unit, what is 3? The answer is that if 4 is the unit, 3 is 3 of four equal parts of 4, and therefore $\frac{3}{4}$ according to the first definition. So the second conception passes over into the first.

3. A fraction is an expression of measured quantity, ratio. In the process of number we start with a whole; we have a unit of measurement; we repeat the unit of measurement to make up the whole. In a measured quantity represented by a fraction we do exactly the same thing. (*Psychology of Number*, page 138.) In the mental process of measurement in which the unit of measure is itself defined or measured, there must be (1) a standard unit of reference (the primary unit), (2) a derived unit (the unit of direct measurement), and (3) the number of these in the quantity. The fraction gives complete expression to this process: In $\$\frac{3}{4}$, for example, (1) the dollar is the unit of reference; (2) it is divided into four parts to get the derived unit — the actual unit of measure; (3) the "numerator" 3 shows how many of these units make up the given quantity, and expresses the *ratio of this quantity to the standard unity* (page 130). Read pages 124 to 144 in *Psychology of Number*.

Fundamental Processes in Common Fractions

713. Changing to equivalent fractions. — This depends upon the multiplying mentioned in the first principle. The approach is made during the first steps in halves, fourths, sixths, etc., by noting equivalents, thus:

$$\tfrac{1}{2} = \tfrac{2}{4} = \tfrac{3}{6}$$
$$\tfrac{1}{3} = \tfrac{2}{6}$$
$$\tfrac{2}{3} = \tfrac{4}{6}$$

Then follow simple exercises which prepare for succeeding processes.

$$\tfrac{1}{3} = \tfrac{\ }{6} \qquad \tfrac{2}{7} = \tfrac{\ }{14}$$
$$\tfrac{2}{5} = \tfrac{\ }{10} \qquad \tfrac{3}{7} = \tfrac{\ }{28}$$
$$\tfrac{1}{6} = \tfrac{\ }{12} \qquad \tfrac{5}{8} = \tfrac{\ }{40}$$

Change $\frac{1}{4}$ to eighths, $\frac{2}{3}$ to ninths, $\frac{3}{4}$ to twelfths, $\frac{5}{6}$ to eighteenths.

714. Reduction to lowest terms. — Apply division of terms in principle one to $\frac{2}{4}$, $\frac{6}{8}$, $\frac{7}{14}$, $\frac{5}{10}$, $\frac{3}{6}$, $\frac{10}{12}$, $\frac{16}{24}$.

715. Whole or mixed numbers. — Changing to whole or mixed numbers is the simple process of division; as, $\frac{8}{4}$, $\frac{6}{4}$, $\frac{8}{3}$, $\frac{12}{5}$, $\frac{24}{7}$.

716. Addition. — Recall that only like numbers can be added. 2 bu. + 8 bu. = 10 bu. To add $\frac{3}{4}$ and $\frac{6}{8}$, change so that pupils will see 4 eights + 6 eights = 10 eights. Thus $\frac{3}{4} + \frac{6}{8} = \frac{12}{8}$. Addition is well presented in most of the text-books. For further exercises, consult any approved text.

717. Subtraction. — No new operations or principles here. Apply common denominator again.

718. Multiplication: fraction by integer. — This operation appears easy. Take multiplication of fraction by whole number first. Proceed as follows:

$$\$7 \times 5 = \$35.$$

$$7 \text{ dollars} \times 5 = 35 \text{ dollars}$$

$$7 \text{ tenths} \times 8 = 56 \text{ tenths}$$

$$\frac{7}{10} \times 8 = \frac{56}{\text{tenths}}$$

$$\frac{7}{10} \times 8 = \frac{56}{10}$$

Explanation by Bailey

This abstract is taken from an address by L. H. Bailey, New York Training School for Teachers, in *N. E. A. Report* for 1905, page 383.

" Let us illustrate by teaching the multiplication of a fraction by an integer. Preparation consists of making sure that the learner has in mind the knowledge through which the discovery of the general principle is to be

made. What does 8 denote? What does the denominator denote? What does the numerator denote? Presentation consists in selecting an example and in finding a method of performing the operation. This may be done objectively or abstractly. We will choose the former. Let us take $\frac{3}{8} \times 2$. We will draw a circle, separate it into eight equal parts, and shade three of them to represent $\frac{3}{8}$. Multiplying $\frac{3}{8}$ by 2 we obtain six of these parts, or $\frac{6}{8}$. To multiply $\frac{3}{8}$ by 2, we multiply the numerator. Comparison consists in showing that every other example in the multiplication of a fraction by an integer is exactly similar to $\frac{3}{8} \times 2$ in all respects essential to the demonstration. This is true because multiplying the numerator of every fraction by an integer will multiply the number of equal parts that are taken without affecting the size of the parts. Generalization consists in stating the general principle. To multiply a fraction by an integer, multiply the numerator. Application consists in following this general principle in the solution of individual examples. Multiply $\frac{8}{13}$ by 9. $\frac{8}{13} \times 9$ is an example in the multiplication of a fraction by an integer; to multiply a fraction by an integer, multiply the numerator; to multiply $\frac{8}{13}$ by 9, multiply the numerator."

719. Multiplication: fraction by fraction. — The next work is to multiply a fraction by a fraction. Development may be as follows:

$$\$\tfrac{3}{4} \times \tfrac{2}{3} = \ ?$$
$$\$\tfrac{3}{4} \times 1 = \$\tfrac{3}{4}$$
$$\tfrac{1}{3} \text{ of } \$\tfrac{3}{4} = \$\tfrac{1}{4}$$
$$2 \times \$\tfrac{1}{4} = \$\tfrac{2}{4} \text{ or } \$\tfrac{1}{2} \text{ ans.}$$

In the second step we have used 1 as a multiplier (process understood from last paragraph). With a mul-

tiplier $\frac{1}{3}$ as large, the product is $\frac{1}{3}$ of $\$\frac{3}{4}$ or $\$\frac{1}{4}$. Using $\frac{2}{3}$ instead of $\frac{1}{3}$ as multiplier, the product is twice as large; hence, 2 times $\$\frac{1}{4}$ or $\$\frac{1}{2}$. The same result may be secured in a shorter process by multiplying the numerators for a new numerator and the denominators for a new denominator.

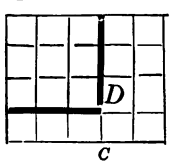
Continued multiplication is a larger application. Use cancellation to review divisors, and reduction to lower terms. Emphasize cancellation as a short, practical process.

$$\frac{5}{6} \times \frac{15}{44} \times \frac{9}{10} \times \frac{33}{45} = ?$$

NOTE. — Concerning multiplication of a fraction by a fraction it might be pointed out that strictly speaking the expression involves contradiction of terms. Multiplication means manifolding or repeating. The multiplier specifies the number of times. But when the multiplier is a fraction, the number of times is not all of one time, but only part of a time, and the idea of repetition vanishes. $\frac{1}{2} \times \frac{3}{4}$, read $\frac{1}{2}$ times $\frac{3}{4}$, strictly speaking, therefore, is nonsense and it means and can only mean $\frac{1}{2}$ of $\frac{3}{4}$. But inasmuch as it is convenient to speak of the process as multiplication and inasmuch as in any case the world will continue to speak of it as multiplication, this is the point at which a somewhat broader definition of multiplication should be introduced; namely, finding a number that is related to the multiplicand as the multiplier is related to unity.

Graphic Illustration of Multiplication

$\frac{3}{4} \times \frac{8}{5}$



Let rectangle AB represent 1. Then AC will represent $\frac{3}{5}$. Then, dividing altitude into fourths, and drawing lines through points of division parallel to base, the whole unit AB will be divided into 20 equal parts and AD, which is $\frac{3}{4}$ of $\frac{3}{5}$, is $\frac{9}{20}$ of the whole unit.

The rule for multiplication may now be made by

inspecting the terms of product and factors and noticing their relation to each other. Then verification and application complete the work. This inductive procedure does not answer the question, Why should the numerator of the product be the product of the numerators of the factors? But the inductive method never does answer that question (see section 697) and insistence on the question why, with reference to such rules, means insistence that arithmetic must be made a deductive science throughout.

720. Faulty arrangement.

Find cost of $3\frac{1}{3}$ yards at $\$2\frac{1}{2}$ a yard.

$$\$2\tfrac{1}{2} = \$\tfrac{5}{2} \times \tfrac{10}{3} = \$\tfrac{50}{6} = \$8\tfrac{1}{3}$$

This statement of the operation does not give mathematical truth. It says $\$2\frac{1}{2} = \$8\frac{1}{3}$. Economy of time and brevity of form are not advantages here. Arrange the work in steps.

$$\$2\tfrac{1}{2} = \$\tfrac{5}{2}$$
$$3\tfrac{1}{3} \text{ yards} = \tfrac{10}{3} \text{ yards}$$
$$\$\tfrac{5}{2} \times \tfrac{10}{3} = \$\tfrac{50}{6} = \$8\tfrac{1}{3}$$
$$\$8\tfrac{1}{3} \text{ ans.}$$

721. Division: fraction by integer. — Recall the third principle in section 711 and apply it.

$$\$18 \div 3 = \$6$$
$$18 \text{ dollars} \div 3 = 6 \text{ dollars}$$
$$18 \text{ twentieths} \div 3 = 6 \text{ twentieths}$$
$$\tfrac{18}{20} \div 3 = \tfrac{6}{20}$$

When the numerator is not exactly divisible, the denominator must be multiplied by the divisor. This is one process that is mastered long before the reasons are understood. Take this: If 4 pads cost $\$\frac{3}{5}$, what is the cost of one pad? Here the process must be by mul-

tiplication of denominator, and the answer is $\$\frac{3}{20}$ or 15 cents.

722. Division: fraction by a fraction. — This is another instance of learning the process before understanding the reasons for the rule.

$$\tfrac{7}{8} \div \tfrac{2}{3} = ?$$
$$1 \div \tfrac{1}{3} = 3$$
$$\tfrac{1}{2} \text{ of } 3 = \tfrac{3}{2}$$
$$\tfrac{7}{8} \text{ of } \tfrac{3}{2} = \tfrac{21}{16}$$

Required to divide $\frac{7}{8}$ by $\frac{2}{3}$. Taking the unit 1 instead of $\frac{7}{8}$, we find that $\frac{1}{3}$ is contained 3 times in 1. Then $\frac{2}{3}$ is contained in 1 one-half of 3 times or $\frac{3}{2}$. As $\frac{7}{8}$ is only $\frac{7}{8}$ of 1, the true quotient is $\frac{7}{8}$ of $\frac{3}{2}$ or $\frac{21}{16}$. We see that a shorter process to this same result is to invert the terms of the divisor and multiply.

$$\tfrac{7}{8} \times \tfrac{3}{2} = \tfrac{21}{16}$$

Inversion of Terms

Another explanation of inversion of terms in division of fractions.

$$\tfrac{7}{8} \div \tfrac{2}{3} = ?$$
$$\tfrac{7}{8} \div 2 = \tfrac{7}{16}$$
$$3 \times \tfrac{7}{16} = \tfrac{21}{16} \text{ ans.}$$
$$\text{Or, } \tfrac{7}{8} \times \tfrac{3}{2} = \tfrac{21}{16} \text{ ans.}$$

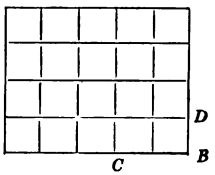
We used 2 as the divisor instead of $\frac{2}{3}$, and the quotient is $\frac{1}{16}$. But the divisor 2 is 3 times too large; hence, the quotient $\frac{1}{16}$ is 3 times too small. Then to obtain true quotient, we must take 3 times $\frac{1}{16}$. The same answer could be secured by the shorter process of inversion and multiplication.

Graphic Illustration of Division

$\frac{3}{4} \div \frac{3}{5}$

The problem, like every problem in division, is a problem in measurement (see a preceding paragraph on division of integral numbers); the divisor is the unit of measure, the dividend is to be measured. The problem then means: if $\frac{3}{5}$ is the unit, what is $\frac{3}{4}$?

Divide base of unit rectangle into fifths and altitude into fourths and draw lines parallel to altitude and base respectively. The rectangle is thereby divided into equal rectangles of which $\frac{3}{5}$ or AC, the measuring unit, contains 12; and $\frac{3}{4}$ or AD, the quantity to be measured, contains 15. $\frac{3}{4} \div \frac{3}{5} = AD \div AC = 15 \div 12 = 1\frac{5}{4} = \frac{5}{4}$. Therefore $\frac{3}{4} \div \frac{3}{5} = 1\frac{5}{4}$.



Inductive method. Noting now relation of terms of quotient to that of dividend and that of divisor, we infer the usual rule.

Another deductive method. Divide $\frac{4}{5}$ by $\frac{2}{3}$. Let x = quotient.

Statement 1. Then $\frac{2}{3} \times x = \frac{4}{5}$.

Reason 1. Division is process of finding one factor when product and other factor are given. Dividend is product, $\frac{2}{3}$ and x the factors.

Statement 2. Therefore $\frac{1}{3}$ of $x = \frac{1}{2}$ of $\frac{4}{5}$.

Reason 2. If equals are divided by equals, the quotients are equal.

Statement 3. Therefore $x = 3 \times \frac{1}{2}$ of $\frac{4}{5} = \frac{3}{2}$ of $\frac{4}{5}$.

Reason 3. If equals are multiplied by equals, etc.

Conclusion. $\frac{4}{5} \div \frac{2}{3} = \frac{4}{5} \times \frac{3}{2}$.

The rule for the inversion of the divisor is here shown

to be a necessary logical consequence of the definition of multiplication and certain fundamental assumptions or axioms.

723. Equation introduced. — The mooted question about the introduction of the equation and x has one decisive answer here. The five axioms of equality, addition, etc., should be illustrated by lines or the balance and the child convinced of their truth.

724. Division: integer by fraction. — Another case is to divide a whole number by a fraction. This case is usually treated before dividing a fraction by a fraction. But after using inversion, we have a simple procedure:

$$7 \div \tfrac{3}{4} = ?$$
$$\tfrac{7}{1} \div \tfrac{3}{4} = ?$$

Here the use of the denominator 1 gives a case exactly like 722.

Decimal Fractions

725. Relation to common fractions. — The relation of decimal fractions to common fractions is treated under three views.

1. The first opinion favors the teaching of decimal fractions as an extension of the decimal system of United States money and the decimal systems of money, weights, and measures in certain foreign countries.

2. The second view makes decimal fractions the equivalents of certain types of common fractions. This means, then, simply another kind of notation, and for this reason many text-books treat common fractions and decimal fractions together.

3. The third view considers decimal fractions very difficult for a child to comprehend on account of so many large denominators. For this reason the subject is

treated in a separate chapter after common fractions have been mastered.

We need not try to decide whether decimal fractions should be taught before common fractions, simultaneously with them, or after them. The vital point is clearness in presentation; and a satisfactory way seems to be to unite the first two opinions and proceed from the known decimal scale of United States money and the known types in common fractions such as $\frac{1}{10}$, $\frac{2}{10}$, $\frac{3}{10}$, $\frac{1}{100}$, $\frac{2}{100}$, $\frac{3}{100}$, $\frac{1}{1000}$, $\frac{2}{1000}$, etc.

726. Suggestions for early lessons. — Denominator means indicator of denomination; *e.g.*, $\frac{3}{4}$, 7 in., 5 hr., etc. In the number 358, the 3 and the 5 need no expressed denominator because of a convention that everybody understands that when digits stand side by side those at the left shall have a value dependent upon position.

Our system being a decimal system, the fractions capable of being brought under the system and expressed without denominator are the various orders of decimal fractions; *i.e.*, those whose denominators are 10 or powers of 10.

As a matter of fact, the extension of our Hindu notation to express fractions, or the discovery of decimal fractions, is a modern European contribution to the system. — Smith, page 66.

It is difficult to see why in such a number as 453.75, 0.05 is any harder to understand than 400. Denomination has to be inferred from position in the one case as the other. 0.05 means five of the hundred parts of the unit, 400 means 4 groups of a hundred units.

727. The decimal point. — The one new feature of decimals is the decimal point. Pupils know numerator, denominator, terms of fraction, value of fraction, frac-

tional unit, and the four operations. The use of the decimal point need not be entirely new in decimals. During the third year of school pupils write such amounts as $2.60, $18.74, and others. They add and subtract such amounts, putting the decimal points under each other. They learn the name decimal point, but they do not know the laws of decimals. An authority on this is *Handbook to Smith's Arithmetics*, page 33 (Ginn). The specific use of the decimal point in decimals is established by changing $\frac{1}{10}$, $\frac{2}{10}$, $\frac{3}{10}$, etc., to equivalent decimals. The application to hundredths, thousandths, and other orders will follow, of course, to bring out the principles of decimal fractions.

728. Principles.

1. Moving the decimal point one place to the right increases the value tenfold; moving two places to the right increases the value one hundredfold, etc.

$$0.082$$
$$0.82 = 10 \times 0.082$$
$$8.2 = 100 \times 0.082$$

2. Moving the decimal point one place to the left decreases the value tenfold; two places, one hundredfold, etc.

$$0.882$$
$$.0882 = 0.882 \div 10$$
$$.00882 = 0.882 \div 100$$

3. Ciphers annexed or rejected at the right of a decimal do not change the value of the decimal.

$$.88 = .880$$

729. Development lesson: notation and numeration. — The matter for lessons on decimals may be found in any good text. The scope of such lessons is indicated here to aid those who need such suggestions.

1. MATTER. Examples covering reading or interpretation; writing decimals; reading and writing mixed decimals. Do not use *and* in reading whole numbers like \$125; but use *and* in place of the decimal point. \$125.60 = one hundred twenty-five dollars *and* sixty cents.

2. ARRANGEMENT.

(*a*) Add: \$18.65 13.46 inches
12.48 8.92 inches
6.22 2.15 inches

(*b*) \$126.18 + \$415.92 + \$75.86.

(*c*) 74.12 ft. + 18.7 ft. + .6 ft.

(*d*) 270.40 + 186.90 + 23.04.

(*e*) Read:

$\frac{7}{10}$, $\frac{17}{100}$, $\frac{170}{1000}$, $\frac{1700}{10000}$

0.6, .16, .160, .175, 2.8,
.705, .023, .003, 7.05, 0.23,
6.306, 42.0094, .3678,

(*f*) Write in figures:

Fifteen hundredths.
Seven thousandths.
One hundred eighty ten-thousandths.
Forty-four and six hundredths.

(*g*) Write in words:

$\frac{626}{1000}$, $\frac{8}{100}$, $\frac{17}{10}$, $\frac{1683}{10000}$

.0024, 0.8, 7.16, 384.681

3. RULES. Read the decimal as an integer and give it the name of its right-hand order.

To write decimals: Express the numerator in figures, and then place the decimal point so that the last right-hand figure shall express the denomination of the decimal.

730. Addition and subtraction. — Write the numbers so that the decimal points shall be in the same column, and then add or subtract respectively as in whole numbers.

1. MATTER. Five or more examples in common fractions and decimals to satisfy inductive process.

2. ARRANGEMENT.

(*a*) Multiply $\frac{3}{10}$ by $\frac{84}{100}$.

$\frac{3}{10} \times \frac{84}{100} = \frac{252}{1000}$.

$.3 \times .84 = .252$.

(*b*) $\frac{12}{100} \times \frac{75}{100} = \frac{900}{10000}$.

$.12 \times .75 = .0900$.

(*c*) 3×0.4, $3 \times .04$, $3 \times .004$.

(*d*) $54.6 \times .30$. (*e*) $0.24 \times .254$.

3. RULE. Multiply as in whole numbers and point off as many places in the product as there are decimal places in both multiplicand and multiplier.

4. OBSERVATION. The principle that product is related to multiplicand as multiplier is related to unity has an important bearing on the question of fixing the decimal point in product. For example, 423.35×0.023 product is of third order below hundredths because multiplier is of third order below unity.

5. ABBREVIATED MULTIPLICATION. The following method is easily explained by reference to foregoing principle, and it is valuable for many reasons. Find to second decimal place circumference of circle whose diameter is 34.62 m. The solution is 34.62 m. $\times$ 3.1416 = circumference.

SOLUTION.

34.62 Diameter
6141.3 Ratio C : D.
103.86
3.46
1.38
.03
.02
108.75 Circumference.

RULE. Write multiplier in reverse order, placing units place under that place of multiplicand in which accuracy is desired in product. In multiplying by any term of multiplier, reject that part of multiplicand lying to the right of term of multiplier in use.

EXPLANATION. Multiply 34.62 by 3 units. Product will be hundredths.

Multiply 34.6 by 1 tenth. Product will be hundredths according to principle in No. 4.

Multiply 34 by 4 hundredths. Product will be hundredths according to principle in No. 4, etc.

The method has the advantage of avoiding useless work as well as that of doing the most instead of the least important part of the work first. It also furnishes an automatic arrangement for rejecting so much and only so much of multiplier as will not affect product. Besides all that, it furnishes an excellent method of making pupils give real reasons rather than thumb rules for their steps.

731. Division: related to common fractions. — The old way is analogous to the plan used in multiplication; namely, from common fractions to equivalent decimal fractions. This shows the reason for the rule that the quotient contains as many decimal places as the decimal places in the dividend exceed the decimal places in the divisor.

732. Division: Austrian method. — In division we have also an "Austrian method," a valuable arrangement. It is not long since a problem like 6.275 divided by 2.5 was " worked " by a rule which was rarely developed. Now the work is arranged in this way:

```
                  2.51
                 ------
2.5)6.275    25)62.75
               50
               -----
               12.75
               12.5
               -----
                0.25
                0.25
```

Such an arrangement leaves no trouble with the decimal point, and the work is easily explained. In the above problem the entire remainder is brought down and the decimal point is preserved throughout, as should be done until the process is thoroughly understood; then the abridgment should appear. — Smith, page 122.

733. Division: inverse of abbreviated multiplication.

Example. What is the diameter of circle whose circumference is 108.75 meters?

Solution. $3.1416 \times \text{Diameter} = \text{Circumference}$

$$\text{Diameter} = \frac{\text{Circumference}}{3.1416}$$

Arrangement as in Austrian method above. Only variation from that method is to reject successively one place in divisor instead of bringing down one more place from dividend in remainder. This rejection would mark off 1416.

```
                34.62
               ------
3.1416)108.75
         94.25
         -----
         14.50
         12.57
         -----
          1.93
          1.88
          ----
             5
```

Denominate Numbers

734. Turn to use. — This part of arithmetic has been mentioned several times in illustrating the application of concrete or objective methods of teaching. All the tables now used are taught by measuring and counting. This is one application of the maxim, "Turn to use." Toy money in actual problems makes the way to the table of United States money; familiar use of the foot-rule and yard-stick leads to the table of linear measure; the measurement of desks, boards, floor, and walls shows a need for square measure; one more dimension in the schoolroom, in boxes, bins, crates, cellars, etc., introduces cubic measure. Likewise in dry measure, liquid measure, and avoirdupois weight. The inference is that the tables should be built, constructed, or made according to actual uses instead of being memorized first and then applied. It is the inductive method instead of the deductive method.

It is at this point, in the use of compound numbers, that geometric and physical principles must be made use of. The straight line and curved, the rectilineal figures and the circle, the right angle and other angles, the square, rectangle, the fundamental concepts, and principles of solid geometry as well as effects of gravitation, specific gravity, principles of lever, of flotation, and the like are necessary in order to make the use of the units of denominate numbers intelligible. These are the problems that add interest to arithmetic and give it a real content, that make it the subject that deals in a concrete, experimental way rather than by the method of deductive demonstration. See *Committee of Ten on Arithmetic and Concrete Geometry*, pages 107 and 110.

Percentage

735. Relation to fractions. — Percentage is a direct outgrowth of the use of common fractions and decimal fractions. When we come to speak of the different methods of presenting the work in percentage, fractions suggest two of the methods, namely: what is called the fractional method or that of common fractions, and the decimal method or that of decimal fractions. A third method is the algebraic method commonly known as the equation. The use of the old formulas for base, rate, percentage, amount, and difference is no longer sanctioned.

736. Method of common fractions. — This method is a favorite one because (*a*) it uses the knowledge of common fractions; (*b*) cancellation is employed as a short, useful, pleasant process; and (*c*) there is little to distract the child's attention under such a direct process.

This use of fractions may be arranged according to difficulties.

1. Fractions that cannot be reduced to lower terms;

$$\tfrac{3}{100},\ \tfrac{7}{100},\ \tfrac{9}{100},\ \tfrac{13}{100},\ \tfrac{61}{100}.$$

2. Fractions that can be reduced to lower terms; as

$$\tfrac{8}{100},\ \tfrac{12}{100},\ \tfrac{18}{100},\ \tfrac{46}{100}.$$

3. Complex fractions; as,

$$\tfrac{3\frac{1}{2}}{100},\ \tfrac{5\frac{1}{2}}{100},\ \tfrac{7\frac{1}{2}}{100},\ \tfrac{8\frac{7}{8}}{100}.$$

A caution should be observed against the use of large numbers in complex fractions. Such fractions are useless if they go beyond the demands of ordinary business life.

4. Aliquot parts; as

$$\tfrac{16\frac{2}{3}}{100} = \tfrac{1}{6},\ \tfrac{33\frac{1}{3}}{100} = \tfrac{1}{3}.$$

A chart showing the equivalent aliquot parts should hang in every class-room.

$\frac{12\frac{1}{2}}{100} = \frac{1}{8} = 12\frac{1}{2}\% = .125$
$\frac{25}{100} = \frac{1}{4} = 25\% = .25$
$\frac{37\frac{1}{2}}{100} = \frac{3}{8} = 37\frac{1}{2}\% = .375$
$\frac{50}{100} = \frac{1}{2} = 50\% = .50$
$\frac{62\frac{1}{2}}{100} = \frac{5}{8} = 62\frac{1}{2}\% = .625$
$\frac{75}{100} = \frac{3}{4} = 75\% = .75$
$\frac{87\frac{1}{2}}{100} = \frac{7}{8} = 87\frac{1}{2}\% = .875$
$\frac{16\frac{2}{3}}{100} = \frac{1}{6} = 16\frac{2}{3}\% = .16\frac{2}{3}$
$\frac{33\frac{1}{3}}{100} = \frac{1}{3} = 33\frac{1}{3}\% = .33\frac{1}{3}$
$\frac{66\frac{2}{3}}{100} = \frac{2}{3} = 66\frac{2}{3}\% = .66\frac{2}{3}$
$\frac{83\frac{1}{3}}{100} = \frac{5}{6} = 83\frac{1}{3}\% = .83\frac{1}{3}$

$\frac{20}{100} = \frac{1}{5} = 20\% = .20$
$\frac{40}{100} = \frac{2}{5} = 40\% = .40$
$\frac{60}{100} = \frac{3}{5} = 60\% = .60$
$\frac{80}{100} = \frac{4}{5} = 80\% = .80$

Other aliquot parts may be used and other arrangements on the chart may be preferred. The given plan emphasizes the grouping of the aliquot parts as common fractions in their simplest form as given in the second column. Pupils should memorize this chart.

737. Method of decimal fractions. — The table of aliquot parts may be used as a table of equivalents also. Then the applications of decimal fractions in percentage are matters of substituting the equivalent decimal for the common fraction. The interpretation of the problem brings nothing new; the operation itself is the same; and the regular principles of decimals are adequate.

738. The method of the equation.

1. This is a valid use of algebra to simplify relations and processes in arithmetic. The early work in arith-

metic has made pupils familiar with such examples as these:

$$6 \times \ ? = 48?$$
$$7 \times \ ? = 63?$$
$$11 \times \$? = \$132?$$

2. The next step is to see that pupils understand that per cent means hundredths, hundredth, or of a hundredth; as

6 per cent means 6 hundredths.
1 per cent means 1 hundredth.
$\frac{1}{3}$ per cent means $\frac{1}{3}$ of a hundredth.

3. The third step in teaching the equation is to impress again the meaning of the symbols $\frac{6}{100}$, .06, and 6%. The table of equivalents should show that all three forms mean the same.

4. A fourth step is a review of the decimal method in percentage. These preparatory steps are really a review of all the work in percentage. Then the pupils are ready for the equation.

$6x? = 30?$
6 times what number $= 30?$
$6x = 30$. By algebra.
If $6x = 30$, what is the value of x?
If $\frac{1}{3}x = 30$, what is the value of x?
If $\frac{1}{2}x = 30$, what is the value of x?
If $\frac{5}{100}x = 30$, what is the value of x?
If $.5x = 30$, what is the value of x?
If $0.05x = 30$, what is the value of x?
If $0.005x = 30$, what is the value of x?

5. Application.

\$12 is 4% of how many dollars?
\$13 is $4\frac{1}{3}$% of how many dollars?
20 miles is 5% of how many miles?

6. Form.

$$0.04x = \$12$$
$$0.04\tfrac{1}{2}x = \$13$$
$$0.05x = 20 \text{ miles.}$$

7. An example solved. *If an automobile is sold for* \$1025 *at a profit of* 25%, *how much did it cost?*

$$\text{Let } x = \text{cost}$$
$$.25x \text{ or } \tfrac{1}{4}x = \text{gain}$$
$$x + .25x = \$1025, \text{ selling price.}$$
$$1.25x = \$1025$$
$$x = \$820, \text{ cost.}$$

Simple Interest

739. Terms used.

1. The sum of money on which interest is paid is the principal.

2. The per cent of the principal paid for the use of the principal for one year is the rate.

3. The money paid for the use of the principal for the entire time is the interest.

4. The interest added to the principal is the amount.

740. Methods.

1. When the time is an exact number of years and months, find interest for one year and multiply this by the number of years.

2. Six per cent method.

3. Exact interest is interest obtained by considering 365 days as one year.

741. Faulty Arrangement.

Avoid untrue statements like the following solution in finding the interest on \$500 for four years at 6%.

$$\tfrac{6}{100} \times \$500 = \$30 \times 4 = \$120.$$

Arrange the work in two steps.

$$\$500 \times \tfrac{6}{100} = \$30$$
$$\$30 \times 4 = \$120 \text{ ans.}$$

Miscellaneous Topics

742. Algebra used in arithmetic. — The close relation between arithmetic and algebra is no longer a matter of doubt. Nearly all the modern text-books on arithmetic have introduced the elements of algebra. The rule and its limitations may be stated thus: Use algebra wherever its use will make the processes in arithmetic easier or clearer.

743. Ratio. — Relation in arithmetic is ratio. Instead of waiting to reach this topic in the last part of arithmetic, it is advisable to use it all through arithmetic. Every analysis that directs attention to comparative quantity uses ratio. Hence, the importance attached to unitary analysis, variable unit, common fractions, and equations.

744. Short processes and business methods. — Modern usage favors the introduction of short processes whenever they are of such a nature that the child can readily comprehend their practical value. For instance, in multiplying by 10 or any multiple of 10 the addition of the number of ciphers found in the multiplier is a direct way to the product; in dividing by 10 or any multiple of 10 pointing off to the left as many places as there are ciphers in the divisor; cancellation, factoring by inspection, the use of aliquot parts in common fractions and percentage and the contracted methods in interest and the other applications of percentage. Dr. Smith says that the teacher who fails to keep in touch with the demands and methods of modern business is not

doing her duty toward herself or the class. In regard to business methods considerable discussion has arisen about how much commercial arithmetic should be introduced in the regular courses. This question brings in the phases of commercial discussion which cannot be treated fully here but suffice it to say that the text-book in use in the school may serve as a guide in the limitations in this matter.

The following footnote, page 218 of the Young's *The Teaching of Mathematics*, is a good presentation of the demands of business.

" An excellent idea of what the business world believes it has the right to expect from schools is given in Still's report to the N. E. A. 1900, digested from six hundred replies representing fifty-seven different occupations and lines of business.

"Mechanical Aids: —

1. Importance of decimal point in business.
2. Necessity for legible figures.
3. Accuracy and speed.
4. Use of interest and discount tables and graded schedules.
5. Use of cash registers and arithmometers.
6. Fractions like $\frac{8}{8}$, $\frac{1}{17}$, $\frac{18}{33}$, etc., should receive scant attention.
7. Importance of "short cuts."
8. Value of teaching multiplication table through 20×20.
9. Importance of familiarity with English money.
10. Business forms, such as checks, notes, receipts, statements, and price lists should be understood by all pupils of the seventh year and upward.
11. Constant repetition and drill in the use of the four fundamental processes.

12. Processes of Solution. (In reply to question as to differences between processes of school work and outside world.) On the whole, no great differences. (In interest, the only case, find interest and amount: facility in the four fundamental processes and approximate estimates important.) "

745. Unitary analysis. — This kind of analysis goes back to one common unit of measure. The fixed unit *one* is the basis.

Illustration. Six books cost $9; find cost of eleven books at the same rate.

$9 = cost of 6 books

$9 ÷ 6 = $1½, cost of *one* book.

$1½ × 11 = $16.50, cost of 11 books.

The other important method of solving problems is the *equation.*

746. Variable unit. — In contrast to the fixed unit *one*, we have the variable unit. When a convenient ratio exists between the two quantities in the problem, it is convenient to use that ratio instead of going back to the cost of *one.*

Illustration. Six books cost $9; find cost of thirty-six books.

$9 = cost of 6 books.

Ratio of 6 books to 36 books is 6.

Hence, $54 = cost of 36 books.

The unit of comparison happens to be 6, but it might be any other number. Note that this device does not apply to the problem in 745; there is no integral ratio between 6 and 11.

747. Series. — Grube and others have used the series of combinations for abstract and concrete drill. Illustration of series in building number 7:

$6+1=7$	$1+6=7$	$2+2+2+1=7$
$5+2=7$	$2+5=7$	$3+3+1=7$
$4+3=7$	$3+4=7$	

748. Arithmetical complement. — The difference between any number and the next higher power of 10 is the arithmetical complement of that number.

3 is the complement of 7, since $7+3=10$.

32 is the complement of 68, since $68+32=100$.

135 is the complement of 865, since $865+135=1000$.

0.26 is the complement of 0.74, since $0.74+0.26=1$.

749. Problems. — " Problems include all the examples in arithmetic in which the operations are not directly stated. They are divided into simple, involving only one operation, and complex, involving more than one operation. The solution of these problems is always made through a form of reasoning called traduction."

750. Proof, verification, or checking. — The proof of correct solution may be answers in the book, the teacher's decision, a second solution in the same way or in another way. Verification of a few problems is worth more than the solution of many additional problems without verification or proof. Some kinds of proof have been mentioned. Here we add that of casting out 9's. This is useful but it fails to detect such errors as the addition of 9, the interchange of digits, and all errors not affecting the sum of the digits.

Casting out 9's to Check Addition

751. Rule. — The excess of any number over a multiple of 9 is equal to the excess of the sum of its digits over a multiple of 9.

$745=9(82)+7$	Excess 7.
$7+4+5=9\times 1+7$	Excess 7.

The proof is practically identical with that given for test of divisibility by 3.

$$\begin{array}{rrrrrl} a+ & b+ & c+ & d+ & e & = \text{sum of digits.} \\ a+ & 10\,b+ & 100\,c+ & 1000\,d+ & \text{etc.} & = \text{the number.} \\ & 9\,b+ & 99\,c+ & 999\,d+ & \text{etc.} & = \text{multiple of 9.} \\ \hline a+ & b+ & c+ & d+ & \text{etc.} & \text{by subtracting.} \end{array}$$

This signifies that a number is equal to the sum of its digits plus a multiple of 9. Hence throw out all the 9's from the sum of the digits and the remainder is the same as though the 9's were thrown out from the number itself. Now take the several examples, throw out the 9's from the sum of the digits, and according to the rule we infer that

$$\begin{array}{rl} 56342 = & \text{a multiple of } 9+2. \\ 64723 = & \text{another multiple of } 9+4. \\ 57849 = & \text{a third multiple of } 9+6. \\ 23454 = & \text{a fourth multiple of } 9+0. \\ \hline 202368 = & \text{a fifth multiple of } 9+12. \end{array}$$

The sum of several multiples of 9 must itself be a multiple of 9. If a number is contained in each of several numbers it is contained in their sum. If equals are added to equals, the sums are equal.

But a fifth multiple of $9+12$ = a sixth multiple of $9+3$, and we perceive (casting out 9's from sum of digits) that 202368 = a multiple of $9+3$. But it is impossible that the same number shall at same time be equal to two different multiples of $9+3$. Therefore the work is probably correct.

Text-Books in Arithmetic

752. Guiding principles. — Arithmetic is no exception to the two pedagogical principles governing the

selection and use of subject-matter. The sociological principle requires matter to be such as will appeal to present and future interests of the community; and the psychological principle requires adaptation to the spiritual capacities. The former determines the nature of the problems; the latter decides arrangement of book and method of teaching.

753. Elimination of subject-matter. — The modern text-books are leaving out a large number of the topics treated in the older books. This view is looking to the practical value of what is learned in mathematics rather than to the disciplinary value of the study. Young argues for simplification and suggests, on page 220, the elimination of the following:

1. G. C. D. or L. C. M. of large numbers otherwise than by factoring.
2. Fractions with large or unusual denominators.
3. Compound or complex fractions.
4. All measures not actually in use in the community at large.
5. Reductions of decimals to common fractions and decimals beyond thousandths.
6. Circulating decimals.
7. Square root and cube root except by factoring.
8. Profit and loss as a separate subject.
9. True discount.
10. Partial payments.
11. Equation of payments.
12. Partnership.
13. Compound proportion.
14. Compound interest.
15. Business forms which do not conform to the usage of the day.

16. Large numbers and exercises involving many numbers.

17. The premature introduction of difficult matter.

754. Content of the problems. — The elimination of matter implies a very close observance of child psychology and business demands. What, then, should be the bearing or nature of the problems? The answer is that the problems should conform to the spirit and content of American life. It is argued that the content taken from geography, history, science, and industrial life is likely to divert attention from the process, but this argument falsely assumes that the teacher is only a passive agent. Such content is a basis for interest that readily permits transition to drill that assures mastery of the processes. "Every usable arithmetic has always been an encyclopedia," says Smith; "what we have to determine is whether it shall now be an encyclopedia of vital, modern facts, or one of obsolete, dull, useless information." (*Monograph*, 1909, page 16.)

Young takes a similar view as he discusses the source of problems in the quantitative side of nature, pages 209 to 214.

Compare sections 649, 749, and 763.

755. Types of books. — The arrangement of material is the second characteristic of modern books, the first characteristic being the nature of the problems. The old books treated each topic exhaustively, and the completion of the book implied the mastery of the subject. The other extreme is a different book for every grade, the eight books constituting an elementary series. Between these extremes, we find several three-book series. The lack of uniformity in grading and courses of study does not encourage the effort to produce one series of arithmetics to satisfy American schools.

Three types of books may be mentioned.

1. TOPICAL. This arrangement is the old type modified by elimination or other means of adjustment. In presenting a complete treatment of common fractions, for instance, the teacher can use her judgment about the quantity of material to be used, the order, the assignment to groups, the drill, etc. The ambitious pupils can go on by themselves, irrespective of class or grade limitations, because they and the teacher feel the stimulus of definite, unified, and complete presentation of the work. The topical arrangement is a compliment to the tactful judgment of the teacher and a source of joyous, invigorating responsibility to the child.

2. CONCESSIVE OR ADAPTED. This type of book embodies the best according to writers of books, and at the same time arranges the matter to suit the average demands of several leading courses of study. It is eclectic in trying to choose desirable material, concessive in trying to suit those who make courses of study, praiseworthy in trying to bring about uniformity, and hopeful in contributing to an American ideal. It may be largely topical, largely spiral, or sanely composite.

3. SPIRAL. This type is the extreme reaction against the old topical books. It is based upon that view of psychology which figuratively uses concentric circles to represent the child's thought from year to year. "It consists," says Smith on page 119, "in taking the class around a circle, say with the topics of common fractions, decimal fractions, greatest common divisor, and square root; then swinging around again on a broader spiral, taking the same topics, but with more difficult problems; then again, and so on until the subjects are sufficiently

mastered." But it is a mistake to assume that the normal child's progress can be arbitrarily limited in that way. The same mistake is observed in the Grube method. There is a deadening effect on the pupils on account of the fragmentary treatment, rigid gradation, and the inhibition of initiative that would otherwise take certain pupils far ahead of their less industrious companions. It is encouraging to know that this type of book is passing into the second type.

New York City Point of View

756. Suggestions. — The sections 757 to 766 inclusive are from the *Course of Study*, and the subsequent sections are based upon the course of study. While this information is helpful for all students, it is used here especially for those who are required to know it.

757. General directions.

1. Much oral drill and blackboard work should be given.

2. Answers should be tested approximately to ascertain whether they are probably correct.

3. The results of addition, subtraction, multiplication, and division should be proved before they are declared.

4. Excessive repetitions of forms of analysis and elaborate written explanations should not be required.

5. Definitions should not be required until the meanings of the terms to be defined are fully understood.

758. The combinations. — Special importance is attached to the thorough mastery of the combinations in addition, subtraction, multiplication, and division. The following are the steps which should be followed in learning the combinations of each table:

759. Addition and multiplication.

1. Care should be taken that the pupils apprehend the nature of the required operations.

2. The combinations that have been taught in the preceding grade should be reviewed frequently.

3. The results of the new combinations should be determined in addition by counting objects, and in multiplication by adding the multiplicand as many times as there are units in the multiplier.

4. The entire table should be repeated with the objects in view in addition, and with the addends in view in multiplication.

5. The entire table should be repeated without the objects or addends in view.

6. The results of combinations, miscellaneously presented, should be given without the aid of any form of mnemonics or external devices. If a pupil misses a combination, there are two methods of correction: in addition he may be told to count objects, and in multiplication to add numbers; or he may be required to deduce the result of the combination in question from the nearest combination whose result he knows. (Thus he may ascertain that $6 \times 7 = 42$ from $5 \times 7 = 35$, since 6 sevens are one seven more than 5 sevens.) The former method is objectionable for two reasons: the performance of an isolated example will be of little value to aid association the next time the combination occurs; and the pupil is in danger of forming the habit of using his fingers as counters. The value of the reference to the nearest known combination consists in the association of the combination in its proper relations with the other terms of a series.

7. Exercises in finding the parts which constitute a

number either as addends or as factors should follow the drills on tables.

8. The combinations should be applied in the solution of simple problems.

760. Subtraction and division.

1. Each combination in subtraction and in division should be related to its corresponding combination in addition or in multiplication. In subtraction the minuend is the sum and the subtrahend is one of the terms of a combination in addition; in division the dividend is the product and the divisor is one of the terms of a combination in multiplication.

2. The results should be stated without the relation, in order that they may be given instantly. An error should be corrected by reference to the primary combination.

3. The combinations should be applied in the solution of simple problems, in order that their mastery may be seen to be a means to an end.

761. Constructive and inventional exercises. — Aside from the consideration of their educational value, the constructive and inventional exercises of the seventh year have been selected with a twofold purpose in view:

1. To furnish pupils with a knowledge of the essential elementary principles involved in the work in mensuration in grade 8A.

2. To furnish pupils with a knowledge of the constructive principles employed in mechanical drawing and construction and in shop work.

The method of teaching these exercises should be suggestive in form and spirit. Formal demonstrations should never be required.

762. Problems. — Numerical relations may be found wherever the mind seeks them; hence problems may be derived and should be derived from the life of the home, the school, the farm, the laboratory, the factory, and the railroad, as well as from the shop and the bank. The limitation of problems to transactions in dollars and cents tends to give practical arithmetic a purely formal and disciplinary character; on the other hand, excursions into other fields of human activity, while sacrificing nothing of the disciplinary value of the subject, give it a varied and interesting content. Problems may be classified as simple, or those involving only one operation, and as complex, or those involving more than one operation.

763. What to look for in the solution of problems. — The solution of problems should be effected by the discovery of *what is given, what is required, and what is the relation* between these terms. If difficulty is experienced in the determination of the relations between large numbers, small numbers should be substituted.

764. Analysis in solution. — A brief and well expressed form of analysis should be employed in the solution of problems to find a part of a number, to find a number when a part is given, to find what part one number is of another, and to find a number when the number plus or minus a part is given, whether common fractions, decimals, or per cent expressions are involved.

765. Rote work criticised. — The mere manipulation of numbers in a set order, which the pupils accept on authority as the means to a correct answer without comprehending the reason therefor, is a form of rote work that ought not to be tolerated except in the teaching of involved and difficult processes to young children

as; for example, the process of long division, or the Euclidean process of finding the greatest common divisor.

766. Progressive advance in difficulties by grades. — The following tabulation shows the progressive advance in the complexity of problems through the grades:

1A. — Simple problems solved without formal explanations.

The children represent the terms by objects and find the results by counting; no term is greater than 10. These involve:

1. Addition and subtraction.
2. Multiplication and division.

1B and 2A. — Simple problems solved without formal explanations.

The children apply the combinations in addition and subtraction as soon as they have mastered them; no term greater than 20. These involve:

1. Addition and subtraction.

The problems are similar to those in 1A, but the results are found from a knowledge of the combinations involved.

2. Multiplication and division.

The problems are similar to those in 1A.

Problems in multiplication are solved by writing the multiplicand as many times as there are units in the multiplier, and by adding.

Problems in division are solved as in 1A by counting.

2B and 3A. — Simple problems solved without formal explanations.

The children apply the combinations in multiplication and division as soon as they have mastered them. These involve:

1. Addition and subtraction.

The problems involve larger terms than in the pre-

ceding grades, and the results are invariably found by aid of the combinations.

2. Multiplication and division.

The problems are similar to those in 1A, but the results are found from a knowledge of the combinations involved.

3B. — Complex problems solved without formal explanations. These involve:

1. Finding a fractional part of a number.

2. Two operations — relations direct.

4A. — Complex problems solved by analysis. These involve:

1. Finding a number when a fractional part of it is given.

2. More than one operation — relations direct. The problems are similar to those in 3B, but are explained formally by analysis.

4B. — Complex problems solved by analysis. These involve:

1. Finding what fractional part one number is of another.

2. More than one operation — relations indirect.

5A. — Complex problems solved by analysis. These involve:

1. Finding a fractional part of a number.

2. Finding a number when a fractional part is given.

3. Finding what fractional part one number is of another.

4. Other problems usually given under the head of common fractions.

5B. — Complex problems solved by analysis. These involve:

1. Finding a decimal part of a number.

2. Finding a number when a decimal part is given.

3. Finding what decimal part one number is of another.

4. Finding a number when the number plus or minus a fractional or a decimal part is given.

5. Other problems usually given under the head of decimals.

6A and 6B. — Complex problems solved by analysis. These involve in 6A:

1. Finding a per cent part of a number.

2. Finding a number when a per cent part is given.

3. Finding what per cent part one number is of another.

4. Finding a number when the number plus or minus a per cent part is given.

5. The problems usually given under the head of denominate numbers.

These involve in 6B:

1. The first four subdivisions of 6A as applied in business.

Each should be related to the corresponding problem in which a common fraction instead of a per cent expression is involved.

7A. — Complex problems solved by analysis. These involve:

1. Simple interest — direct case.

2. Metric system.

3. Foreign money.

4. Longitude and time.

5. Common relations.

7B. — Complex problems solved both by analysis and by algebra. These involve:

1. Simple interest — indirect cases.

2. Simple interest — applications.

3. Percentage — indirect cases.
4. Problems solved by proportion.
5. Common relations.

8A. — Complex problems solved by analysis or by algebra. These involve:

1. Mensuration.
2. Business relations.
3. Common relations easily expressed by two unknown quantities.

767. Problems illustrating progressive order of difficulties. — This section gives illustrative examples and problems that may be used to overcome difficulties in the order in which those difficulties arise.

Subtraction

1. $8 - 5$. Inverse of addition.
2. $14 - 9$. Inverse of addition; borrowing.
3. $24 - 9$. Borrowing units.
4. $213 - 38$. Borrowing units and tens.
5. $304 - 126$. Zero and borrowing hundreds.

Multiplication

1. 297×135. No zero used.
2. 297×130. Zero in the units column.
3. 297×103. Zero in the tens column.

Division

1. $786 \div 265$. No zero in divisor.
2. $786 \div 205$. Zero in tens column.
3. $780 \div 250$. Zero in units column.

Addition and Subtraction of Fractions

1. $\frac{6}{7} + \frac{2}{7} + \frac{1}{7}$
2. $\frac{6}{7} - \frac{2}{7}$

Denominators the same.

3. $\frac{1}{4} + \frac{3}{8} + \frac{1}{2}$
4. $\frac{3}{8} - \frac{1}{4}$

One denominator is common denominator.

5. $\frac{7}{8} + \frac{2}{3} + \frac{3}{8}$
6. $\frac{7}{8} - \frac{2}{3}$

Miscellaneous denominators.

7. Bought $3\frac{1}{8}$ lbs. Ceylon tea, $2\frac{5}{8}$ lbs. of Japan tea, and $5\frac{3}{8}$ lbs. Canton tea. How many lbs. in all?

8. A merchant bought $28\frac{1}{2}$ bu. potatoes. He bought $7\frac{1}{8}$ bu. from A, $13\frac{3}{4}$ bu. from B, and the remainder from C. How many bu. did C sell?

9. Fred walked $12\frac{3}{7}$ miles, Luke $13\frac{7}{10}$ miles, and Walter $4\frac{3}{5}$ miles. How far did the three boys walk?

Subtraction of Mixed Numbers

1. $12\frac{7}{8} - 5\frac{3}{8}$. Same denominators.
2. $12\frac{7}{8} - 5\frac{3}{4}$. 8 = common denominator.
3. $12\frac{3}{8} - 5\frac{7}{8}$. Same denominators; borrowing.
4. $12\frac{3}{4} - 5\frac{7}{8}$. Different denominators; borrowing.
5. $12\frac{1}{11} - 5\frac{3}{11}$. Denominators difficult.

Multiplication of Fractions

1. $\frac{3}{4}$ of \$16. Familiar operation.
2. $\frac{3}{4} \times 12$. Fraction by integer.
3. $12 \times \frac{3}{4}$. Integer by fraction.
4. $\frac{3}{4} \times \frac{7}{8}$. Fraction by fraction.
5. At $\$\frac{3}{8}$ a yard, what is cost of 75 yds.?
6. Find cost of 10 tons of coal at $\$6\frac{3}{4}$ a ton.
7. Find cost of $\frac{2}{3}$ can of molasses at $\$\frac{7}{8}$ a can.
8. If land is worth $\$40\frac{1}{2}$ an acre, what is the value of a farm of $12\frac{1}{4}$ acres?

Division of Fractions

1. $\frac{6}{7} \div 3$. Numerator divided.
2. $\frac{6}{7} \div 3$. Denominator multiplied.
3. $12 \div \frac{3}{4}$ See section 724.
4. $\frac{3}{4} \div \frac{1}{2}$.
5. $6\frac{1}{3} \div 2$. 6. $6\frac{1}{3} \div 2\frac{1}{2}$.
7. A woman exchanged 30 lbs. of butter at \$.25 per lb. for cloth costing \$.37½ a yard. How many yards did she get?

Division of Decimals

Addition, subtraction, and multiplication of decimals do not involve many difficulties. Following is an order for division:

1. $638.724 \div 12$. 2. $63872 \div .12$.
3. $638.72 \div .012$.
4. At $5\frac{1}{2}$ cents per lb., how much sugar can be bought for \$4.40?

768. Methods applied in New York City. — This suggestive work is more specific than what precedes in the chapter on arithmetic.

Addition

769. Grade 1A. — Combinations of numbers of one order with 1 and 2.

$$\frac{1}{2}\ \frac{2}{3}\ \frac{9}{10}\ \text{to}\ \frac{1}{10};\ \text{also}\ \frac{1}{2}\ \frac{1}{3}\ \frac{1}{4}\ \frac{1}{5}\ \text{to}\ \frac{1}{10}$$

$$\frac{2}{4}\ \frac{3}{5}\ \frac{4}{6}\ \text{to}\ \frac{9}{11};\ \text{also}\ \frac{2}{5}\ \frac{2}{6}\ \frac{2}{7}\ \text{to}\ \frac{2}{11}$$

These combinations are taught by counting objects; later the value of each is recognized at sight, without counting, and memorized. No written addition in this grade.

770. Grade 1B. — New combinations.

$$\begin{array}{cccccccccccc} 3 & 4 & & 9 & & & 3 & 3 & 3 & & 3 \\ \underline{3} & \underline{3} & \text{to} & \underline{3}; & \text{also} & & \underline{4} & \underline{5} & \underline{6} & \text{to} & \underline{9} \\ 6 & 7 & & 12 & & & 7 & 8 & 9 & & 12 \end{array}$$

$$\begin{array}{cccccccccccc} 4 & 5 & 6 & 9 & & & 4 & 4 & 4 & & 4 \\ \underline{4} & \underline{4} & \underline{4} & \underline{4}; & \text{also} & & \underline{5} & \underline{6} & \underline{7} & \text{to} & \underline{9} \\ 8 & 9 & 10 & 13 & & & 9 & 10 & 11 & & 13 \end{array}$$

Written addition: numbers of one order, numbers of two orders, within the tables, with no carrying. Use 1A combinations at first.

(1)

$$\begin{array}{ccc} 2 & 1 & 1 \\ \underline{1} & \underline{3} & \underline{5} \end{array}$$

$$\begin{array}{ccc} & & 1 \\ 1 & 3 & 1 \\ \underline{} & \underline{} & \underline{} \end{array} \qquad \begin{array}{c} 2 \\ 2 \\ \underline{} \end{array}$$

(2)

$$\begin{array}{ccccc} 2 & 1 & 0 & 1 & 1 \\ \underline{1} & \underline{1} & \underline{5} & \underline{1} & \underline{1} \end{array}$$

(3)

$$\begin{array}{ccc} 11 & 12 & 11 \\ \underline{11} & \underline{10} & \underline{12} \end{array}$$

$$\begin{array}{ccc} 11 & 12 & 11 \\ 11 & 10 & 12 \\ \underline{11} & \underline{11} & \underline{11} \end{array}$$

When teaching addition of two orders, designate units and tens columns.

Now use examples with 1B combinations, no carrying.

13	43	31
23	11	11
3	13	12
		34
		10

In column addition, not more than five numbers to be used, and no addend greater than four to be used.

In this grade the signs + and = are used in tables.

771. Grade 2A. — The tables through 9's completed.

5	6	to	7		5	5	to	5	
5	5		5		6	7		9	
6	7	to	9		6	6		6	
6	6		6		7	8		9	
7	8		9		7	7			
7	7		7		8	9			
8	9			8					
8	8			9					
9									
9									

Written addition: numbers of two and three orders; in column addition, not more than five addends; addition with carrying.

Numbers of two orders. Here it is necessary to reach the fundamental fact that ten units make 1 ten.

26	34	13
33	26	7
1	31	76

Numbers of three orders; carrying units only.

231	713	
416	134	
135	149	etc.

Numbers of three orders; carrying units and tens.

314	347	
486	266	
121	143	etc.

141	382	624
463	110	40
123	235	103
146	117	71
31	110	76

Teach fact that ten tens make one hundred.

In the 2B, the column addition is limited to 6 addends.

772. Grade 3A. — Numbers of four orders; carrying into the thousands column. Special attention given to accuracy and rapidity.

Subtraction

773. Grade 1A. — Subtraction in this grade is taught objectively, and as the inverse of addition.

$6 + 2 = 8$ carries with it $6 + ? = 8$, and $? + 6 = 8$ or 8 less $6 = ?$ 8 less $2 = ?$

774. Grade 1B. — Subtraction within the tables.

$1 - 0 = 1$
$1 - 1 = 0$
$2 - 1 = 1$
$3 - 1 = 2$
$4 - 1 = 3$ to $9 - 1 = 8$

$2 - 2 = 0$
$3 - 3$
$4 - 4$ to $9 - 9$

Minus sign (−) taught; vertical form taught.

(1) 1 2 3 to 9
$-\underline{1}$ $-\underline{1}$ $-\underline{1}$ $-\underline{1}$

(2) 15 26 36
$-\underline{1}$ $-\underline{1}$ $-\underline{1}$

(3) 26 36 45 78
$-\underline{11}$ $-\underline{11}$ $-\underline{11}$ $-\underline{11}$

(4) 42 58 63
$-\underline{12}$ $-\underline{22}$ $-\underline{21}$

(5) 46 79 87
$-\underline{34}$ $-\underline{43}$ $-\underline{40}$ etc.

775. Grade 2A. — Subtraction within the tables. Written subtraction, without borrowing; numbers of two and three orders.

99 87
$-\underline{78}$ $-\underline{62}$

899 413
$-\underline{678}$ $-\underline{202}$

776. Grade 2B. — Subtraction with borrowing; two or three orders. Special attention given to proofs and accuracy.

(1) 426 368 borrowing tens only.
$-\underline{117}$ $-\underline{249}$

(2) 426 368 borrowing hundreds and
$-\underline{137}$ $-\underline{276}$ tens.

(3) Use of zero and borrowing.

804	790	506	300
− 322	− 648	− 268	− 124

Methods used in subtraction: borrowing.

425
− 186

6 from 5 I cannot take; borrow 1 ten from the 2 tens, add to the 5 units, making 15 units. 8 tens from 1 ten I cannot take, so I borrow one 100 (or 10 tens) from 4 hundreds.

10 tens and 1 ten = 11 tens
8 from 11 leaves 3
1 from 3 leaves 2
239 ans.

Explanation by decomposition:

425 =	4 h.	+	2 t.	+	5 u.	=	400	+ 20	+ 5
=	3 h.	+	11 t.	+	15 u.	=	300	+ 110	+ 15
− 186 = −	1 h.	+	8 t.	+	6 u.	=	100	+ 80	+ 6
	1 h.	+	3 t.	+	9 u.	=	200	+ 30	+ 9

Methods in subtraction: the tens method.

425
− 186

6 from 5 I cannot take, so I add 10. 6 from 15 = 9.

When I add 10 to the minuend, I must add 10 to the subtrahend. (Principle of subtraction: If both minuend and subtrahend be equally increased, the difference will not be changed.)

9 from 2 I cannot take, so I add 100 to the minuend.

100 = 10 tens
9 from 12 = 3.

According to principle, add 100 to subtrahend.

2 from 4 = 2

239 ans.

Explanation by decomposition:

$$\begin{aligned} 425 + 10 + 100 &= 4\text{ h.} + 12\text{ t.} + 15\text{ u.} \\ -186 + 10 + 100 &= 2\text{ h.} + 9\text{ t.} + 6\text{ u.} \\ \hline & 2\text{ h.} + 3\text{ t.} + 9\text{ u.} = 239 \end{aligned}$$

Methods in subtraction: German or complementary.

$$\begin{array}{r} 425 \\ -\ 186 \\ \hline \end{array}$$

I cannot take 6 from 5, so I take 6 from 10 = 4.

5 + 4 = 9

When you say " from ten " in the units column, add 1 to the next subtrahend. (No reason given.) 9 from 2 I cannot take; 9 from 10 = 1; 2 and 1 are 3. Add 1 to next subtrahend; 2 from 4 = 2. Ans. 239.

The advantage of this method is that subtraction facts through 10 only need to be learned.

Methods in subtraction: Austrian or additive. — The process of finding what must be added to the subtrahend to produce the minuend.

$$\begin{array}{r} 425 \\ -\ 186 \\ \hline \end{array}$$

6 and 9 are 15
8 " 3 " 11 } first way.
1 " 2 " 3

Explanation:

$$\begin{aligned} 425 &= 400 + 20 + 5 = 300 + 110 + 15 \\ 186 &= 100 + 80 + 6 = 100 + 80 + 6 \\ \hline & \qquad\qquad 200 + 30 + 9 \end{aligned}$$

and are

$$\left.\begin{aligned} 6 + 9 &= 15 \\ 9 + 3 &= 12 \\ 2 + 2 &= 4 \end{aligned}\right\} \text{second way.}$$

Explanation. Add 10 to each, then 100.

$$\begin{aligned} 425 &= 400 + 20 + 5 = 400 + 120 + 15 \\ 186 &= 100 + 80 + 6 = 200 + 90 + 6 \\ & \qquad\qquad\qquad\quad 200 + 30 + 9 \end{aligned}$$

Advantages. No subtraction tables need be learned. Addition facts being used so much more frequently than those of subtraction, there is an increase of speed and certainty.

To prove subtraction, add subtrahend and remainder to produce minuend.

777. Grade 3A. — Numbers of four orders.

$$\begin{array}{r} 7314 \\ -\ 3247 \\ \hline \end{array} \qquad \begin{array}{r} 8420 \\ -\ 6548 \\ \hline \end{array} \quad \text{etc.}$$

Multiplication

778. Grade 2B. — Multiplicands of two orders; multipliers 2, 3, 4, 5.

PREPARATION. Counting by 2's, 3's, 4's, 5's (review).

PRESENTATION. Develop multiplication tables in following way:

$$\begin{array}{cccccc} & & & & 2 & \\ & & & 2 & 2 & \\ & & 2 & 2 & 2 & \\ & 2 & 2 & 2 & 2 & \\ \underline{2} & \underline{2} & \underline{2} & \underline{2} & \underline{2} & \text{etc.} \end{array}$$

How many times have I written 1? 1 time.

Write 1 times 2 = 2.

What is the symbol for times? $\times$.

Write it on board.

How many times have I written 2? 2 times.

$2 \times 2 = 4$ etc.

When you have developed tables, ask children to write the work in vertical form.

2	2	2	2	2	2	
$1\times$	$2\times$	$3\times$	$4\times$	$5\times$	$6\times$	etc.

After tables have been developed and written in *vertical form*, write:

tens	units	
11		Children say $2 \times 11 = 22$.
	$2\times$	
22		

Here is another way of doing it:

tens	units	
11		2×1 unit $= 2$ units.
	$2\times$	Put 2 in units place.
22		2×1 ten $= 2$ tens.
		Put 2 in tens place.

Have children notice that product is same.

Order of difficulties:

24	23	30	52
$2\times$	$2\times$	$2\times$	$2\times$

Multiplication involving carrying. Multipliers 2, 3, 4, 5.

PREPARATION. Drill on multiplication tables.

tens	units	
26		2×6 units $= 12$ units.
	$2\times$	Put down 12.
12		2×2 tens $= 4$ tens.
4		Put 4 in tens place.
52		Add: 4 tens $+$ 1 ten $= 5$ tens.

Shorter way:

tens	units	
26		2 × 6 units = 12 units.
2 ×		12 units = 1 ten and 2 units.
52		Put 2 in units place.
		2 × 2 tens = 4 tens.
		4 tens + 1 ten = 5 tens.

Order of difficulty. Multipliers 2, 4, 5, 3.

779. Grade 3A. — Multiplication of numbers of three orders by numbers of one order.

Order of difficulty:

113	124	345
6 ×	6 ×	6 ×
104	340	142
6 ×	6 ×	10 ×

780. Grade 3B. — Multiplication of numbers of three orders by numbers of two orders.

PREPARATION.

27	27	
3 ×	10 ×	Review.

PRESENTATION. 13 is the same as 1 ten and 3 units.

tens	units	
27		What shall we multiply by first?
13 ×		By 3.
81		3 what?
270		3 units.
351		Multiply.
		Now what is the next figure?

1.

1 what?

1 ten.

Multiply by 10 units.

270 units.

What shall I do to get the product?

Add.

Why?

Because we multiplied by 10 and 3, and that is the same as multiplying by 13.

Let us take an easier way.

Multiply by 3 units.

hundreds
tens
units

27	Now what is the next figure?
13 ×	1.
81	1 what?
27	1 ten.
351	1 ten × 7 =
	7 tens.

Where shall I put it?

In the tens place.

1 ten × 2 tens (or 20) = 20 tens.

20 tens = 2 hundreds.

Put 2 in hundreds place. Add.

Have children notice that we omitted 0 in units place.

thousands
hundreds
tens
units

127	107	470
13 ×	13 ×	26 ×
381	321	2820
127	107	940
1651	1391	13220

Division

781. Grade 2B. — Short division, without remainders.
PREPARATION.

$$\begin{array}{cccccc} & & & & 2 & \\ & & & 2 & 2 & \\ & & 2 & 2 & 2 & \\ \underline{2} & & \underline{2} & \underline{2} & \underline{2} & \text{etc.} \end{array}$$

How many 2's in 2? 1.
How many 2's in 4? 2.
How many 2's in 6? 3.
How many 2's in 8? 4.
What is addition sign? $+$.
What is subtraction sign? $-$.
What is multiplication sign? $\times$.
What is division sign? $\div$. (If they do not know, tell it.)

PRESENTATION. Read from board, $2 \div 2$.

What does this mean? It means to separate the first number (dividend) into groups of 2's, and tell how many there are. It means how many 2's in 2? $4 \div 2 = ?$ What does this mean? It means to separate 4 into groups of 2's, and tell how many 2's in 4, etc., etc.

I shall show another way to write a division example.

$$2\overline{)2} \qquad 2\overline{)4} \qquad 2\overline{)6}$$

Read: What does it mean?

$$\begin{array}{rr} 10 & 12 \\ \hline 2)20 & 2)24 \end{array}$$

Then teach inexact division. What does this mean? $2\overline{)5}$ It means separate 5 into groups of 2's.

$$\overbrace{//} \quad \overbrace{//} \quad /$$

How many 2's? 2 2's and 1 remaining.

2)7 2)9 2)11 2)13 etc.

782. Grade 3A. — Short division with remainders.

1 6 How many 2's in 3 tens?
2) tens units 1 and 1 remaining.
3 2 1 what?
1 ten.

1 ten = 10 units; 10 u. + 2 u. = 12 u.; how many 2's in 12?

6 2's in 12.

Order of difficulty:

2)452 2)728 2)1608 2)1430

Divide by 3, 4, 5, 6, 7, 8, 9.

783. Grade 3B. — Long division.

1. How many 2's in 4? 2.
20)40 2. Then how many 20's in 40? 2.
3. Which number did you try first? 2.
1. How many 3's in 12? 4.
4 2. Then how many 30's in 120? 4.
30)120 3. Which number did you try first? 3.
1. How many 2's in 17? 8.
8 2. How many 20's in 170? 8.
20)170 3. Which number did you try first? 2.

We call the number we try first the trial divisor.

PRESENTATION. I shall show you another way of writing this example. How many 2's in 17?

1. How many 20's in 170? 8.
20)170 2. Multiply $8 \times 20 = 160$.
160 = 8×20 3. How much left?
10 4. Say nothing about remainder.

21	1. Which number do we try first?
21)441	
42 = 2 × 21	2. How many 2's in 4? 2.
21	3. How many 21's in 44 tens? 2
21 = 1 × 21	tens.
0	4. Multiply.
	5. Left? 2 tens.

6. 2 tens = 20 u. 20 u. + 1 u. = 21 u.
7. How many 2's in 2.
8. How many 21's in 21?
9. Multiply.

Class tell steps.

31	1. Try.
31)961	2. Divide.
93	3. Multiply.
31	4. Compare.
31	5. Subtract.
First Step.	6. Compare.
	7. Bring down.

Second Step. When the divisor is contained in one or more of partial dividends fewer times than the trial divisor is contained in trial dividend.

```
  43
35)1505
  140
  105
  105
```

Third Step. When the divisor is contained in one or more of partial dividends a greater number of times than trial divisor is contained in trial dividend.

$$
\begin{array}{r}
93 \\
19\overline{)1767} \\
171 \\
\hline
57 \\
57 \\
\hline
\end{array}
$$

Fourth Step. When a zero occurs in quotient.

$$
\begin{array}{r}
27 \\
205 \\
32\overline{)6587} \\
64 \\
\hline
187 \\
160 \\
\hline
27
\end{array}
$$

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W. A. Cornish, Department of Mathematics, State Normal School, Cortland, N. Y., who personally directed the revision of the chapter on arithmetic for this edition.

CHAPTER XVI

QUESTIONS ON THE TEXT

1. Comment on the meaning of education as defined by Butler.

2. Mention six subjects in an elementary course of study and classify each under the intellectual inheritances discussed by Butler.

3. Define and illustrate correlation, co-ordination, concentration, and enrichment as applied to a curriculum.

4. Explain and apply the culture epoch theory.

5. Define apperception. Illustrate its application in (*a*) first-year reading, (*b*) eighth-year arithmetic.

6. What is meant by a principle of education? Distinguish principles of education and maxims of teaching.

7. Define habit. What are the three fundamental laws of habit?

8. What do you understand by interest in the educational use? Show relation of attention and interest.

9. What is meant by a mental faculty? Mention the faculties in their natural order of development.

10. Show that habit includes all the aims of education.

11. What are the advantages of opening exercises? Prove your answer by showing relation to habit.

12. What is implied in the term "group teaching"? Advantages?

13. Outline affirmative and negative arguments on home study.

14. Discuss examinations in regard to (*a*) purposes, (*b*) kinds, (*c*) marking.

15. Mention five suggestions to guide the moral instruction of pupils.

16. What is punishment? Classify kinds as approved and disapproved.

17. Give three objections to corporal punishment. Show bearing of inhibition by repression.

18. Give favorable and adverse criticisms of the Socratic method. Briefly discuss three other methods.

19. It is said that the inductive process of reasoning leads to the general notion. Explain meaning and formation of a general notion. In your answer show that the general notion utilizes sensation, perception, imagination, memory, judgment, and reasoning.

20. Explain and illustrate (*a*) apperceiving mass or group, (*b*) reaction in psychology, (*c*) artificial incentives.

21. Name five school virtues that should be substituted respectively for five school vices, and explain your method of inhibiting by substitution.

22. What is your interpretation of the term general method? Show how it embodies the inductive-deductive method, method-whole, from particular to general, and from concrete to abstract. What is its relation to the apperceptive process?

23. State three causes of inaccuracy in spelling.

24. Make a list of ten words frequently misspelled, give reasons for difficulty in each word, and state specifically how to teach pupils to observe and overcome such difficulties.

25. How should homonyms be taught?

26. What uses of the dictionary can be taught in (*a*) primary grades, (*b*) grammar grades?

27. Illustrate a practical way of teaching word-analysis by applying it to five words.

28. Outline five other ways of teaching the meaning of words.

29. (*a*) What is the meaning of dictation exercises? (*b*) What is the aim or purpose? (*c*) Describe faulty dictation exercises. (*d*) Illustrate appropriate dictation work for an intermediate grade. Make it correlate at least four subjects of instruction.

30. Types are bases of apperception. Explain; illustrate a type in grammar, spelling, geography.

31. What are three uses of a model in composition?

32. What is the difference between criticism and correction of compositions, from the teacher's point of view?

33. Outline five plans of criticism, and then defend a composite plan.

34. Present a commendable plan of correcting compositions after criticism.

35. What fundamental facts in grammar may be used in helping pupils acquire useful habits of mental activity?

36. What is the critical distinction between an attribute adjective and an adverb modifier?

37. Outline a lesson on adverb modifiers according to the Herbartian steps.

38. Cite the rules governing the use of *shall* and *will*.

39. Classify participles according to use.

40. Illustrate ten uses of infinitives.

41. What are the essential facts in a lesson on concord of relative pronoun and antecedent?

42. Justify the statement that the development lesson uniting words, phrases, and clauses is in accordance with the requirements of apperception.

43. Select a definition of geography and defend your selection.

44. Using your home city as a type, you prepare a lesson-plan for a primary class. What topical headings do you use in your plan?

45. Outline a lesson on Alaska. What elements of prior knowledge can you utilize? Under habituation to formal outlines, what topics will a child expect to find in your outline? Quote section as authority.

46. Comparison in geography is a guaranty of mental economy. Explain, defend, or disprove.

47. Select three important subjects for lessons in geography, give reasons for your selections, and mention points of strength and weakness in the lessons as presented in this book.

48. Express your approval or disapproval, with reasons on (*a*) the suggested way of studying a map, (*b*) the suggested way of studying the text.

49. State specifically how the teaching of geography helps in forming desirable habits for life.

50. How does instinctive imitation tend to strengthen character in primary history work?

51. Show that history and civics stimulate the spirit of patriotism in grammar grades.

52. Outline a lesson in history to illustrate cause and effect.

53. Refer to five sections that suggest ways of making history real to elementary pupils.

54. Comment on (*a*) the use of note books, (*b*) the source method, (*d*) the means of correlation in teaching history and civics.

55. What conditions determine the selection of reading-matter in the first year?

56. Contrast the old and the new types of books in reading.

57. (*a*) What four methods are combined in the McCloskey method in reading? (*b*) Do you approve a combination method? Why? Is this method analytic-synthetic? Why?

58. Briefly characterize the Aldine method.

59. What physical and mental difficulties may be encountered in teaching reading?

60. Classify the difficulties found in ordinary selections for reading, and tell how each difficulty should be removed.

61. Justify your way of helping pupils memorize a selection.

62. Select five important topics in reading, aside from the topics in the seven preceding sections, and give reason why each selection is important.

63. Prove that the habit of intelligent interpretation in reading is a source of success in all the other work in school.

64. Tell specifically what you do in teaching counting in the first grade. Show application of measuring. What would you measure and with what would you measure?

65. Explain the procedure in teaching division of decimals. What rule or principle results?

66. Give, in the order of difficulty, five examples you would use in teaching short division.

67. What is meant by a type in arithmetic? Name the five type examples in common fractions and percentage. Give graphic illustration of one of the types in fractions; and make a practical, concrete problem to illustrate one of the types in percentage.

68. Tell how you teach longitude and time in arithmetic. Show three direct correlations with life.

69. Illustrate and explain borrowing and carrying in arithmetic.

70. Enumerate three methods of teaching percentage. Make a practical problem and solve it to illustrate the three ways just mentioned.

71. Write analysis of the problem given in answer to 70.

72. What is meant by business applications of percentage? Illustrate three such applications by making three concrete problems.

73. Explain and illustrate graphic methods in arithmetic. Why do such illustrations help apperception?

74. Briefly describe five devices in teaching arithmetic.

75. Define number. Give psychological justification of your definition.

76. Defend two conceptions of common fractions.

77. Solve a problem by unitary analysis; explain; contrast variable unit process applied to the same problem.

78. Induction, deduction, and analogy are mentioned under kinds of reasoning. Illustrate induction by outlining a lesson on division of a common fraction by an integer; deduction in division of decimals; analogy in history.

79. Describe three ways of performing subtraction. Quote page in this book. Advocate, giving authority, your choice of the three ways

80. Accuracy is a habit classified as a school virtue. This habit depends upon knowing how to study. Tell explicitly how you teach pupils to acquire accuracy in studying (*a*) spelling, (*b*) model in composition, (*c*) a

problem in reduction of denominate numbers, (*d*) a selection for memorizing.

81. Consult section 70 for discussion of reaction. There are motor reactions in speaking, singing, writing, drawing, dancing, etc. Show how five kinds of motor reaction help in fixing impressions. Be specific in your answer, *e.g.*, how written expression tends to mastery of thought in arithmetic, history, and other subjects.

82. You aim to develop the critical habit of detection and correction of errors. (*a*) What is your procedure in written compositions? (*b*) Apply to map-sketching in history and geography. (*c*) What plan of checking (verifying or proving) do you teach for each of the four fundamental operations in arithmetic?

83. The law of self-activity of the pupil applies at all times. State briefly and explicitly how you employ this instinct in five different educative ways.

84. Evils and virtues are treated in sections 166 and 167. Those virtues become a part of character by a process of gradual habituation. For each of those virtues, show one way in which your teaching strengthens character.

85. Three laws underlying habit are plasticity, motive, regular repetition. Show bearing of these laws on teaching primary arithmetic. Mention five kinds of drill to secure accuracy and rapidity.

86. In speaking of training the memory, we have the terms apprehension, retention, and reproduction; association by similarity and contiguity. Illustrate the first three in teaching THE CHILDREN'S HOUR; apply similarity and contiguity in geography, using New York City as an illustrative type.

87. What contemporary events in English history

should be studied in connection with the American Revolution? Justify your answer by principles of education.

88. Mention five ways in which methodical daily teaching tends to strengthen the power of attention of pupils.

89. Alertness, persistent thinking, and co-operative activity are three desirable indications of effectual teaching. Discuss questioning, under a limit of two hundred words, in relation to these ends.

90. "Turn to use" is a maxim in education. Apply this maxim by outlining ten ways of enlarging pupils' vocabularies in the elementary schools.

91. What is the connotation of the words originality and spontaneity (*a*) from the teacher's viewpoint in management, (*b*) from the pupil's viewpoint in composition?

92. What is the value of drill in education? Briefly present your methods and devices in two subjects.

93. What is meant by a good school spirit? How is it secured?

94. Education implies mental, moral, and physical development. Show how the work of one day in school may exemplify the truth of this statement.

95. Every element in school organization carries an opportunity in education. Enumerate ten such opportunities, aside from assigned subject-matter. (Think of marching, singing, cleaning boards, arranging books in desks, etc.)

96. Mention ten of the teacher's methodical ways that are worthy bases for pupils' habits. To what extent is imitation operative? Apply suggestion also.

97. If you are asked to outline a discussion of topics

I and II, what other points do you desire to add? If no others, state tersely why you think the points given are adequate. Would such school habits be good life habits?

I. Securing and retaining attention.

1. Comfortable environment.

2. Personality of teacher: attractive appearance, inviting manner, persuasive voice.

3. Habit of expectancy in pupils in relation to board, charts, presentation of lesson, drill, and assignment; *i.e.*, variety.

4. Interest through play-impulse.

5. Orderly, progressive questions; get pupil to ask himself questions.

II. How to interest pupils.

1. Teach them how to work: consciousness of power to accomplish something.

2. Sympathy, leadership, recognition of meritorious results.

3. Adaptation through proper grading and grouping; discouragement obviated.

4. Useful methods in teaching: graphic, varied; processes worthy of imitation when pupil is studying alone.

98. Define reasoning. Can you prove that pupils are learning to reason when they are seeking reasons for each of the school virtues? Does the will enter this process?

99. Comment on this conclusion by Rousseau: "Education is certainly nothing but a formation of habits."

100. Define method.

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